

# THE IRON AGE

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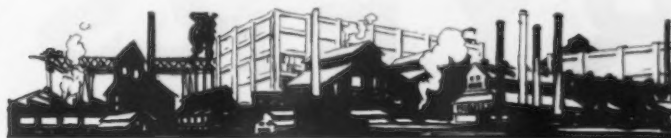
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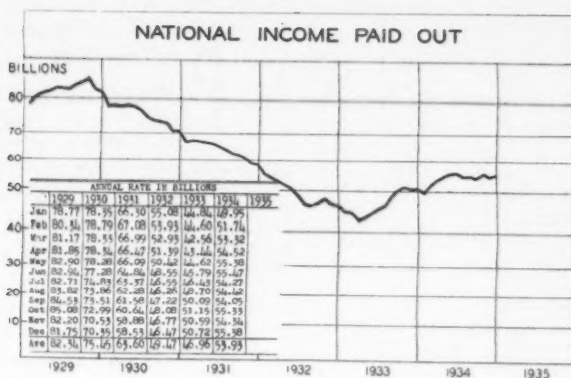
# THE IRON AGE

FEBRUARY 21, 1935

ESTABLISHED 1855

Vol. 135, No. 8

## Down Hill and Up



THIS new chart shows income paid out and is the most comprehensive available index of general business activity. Payments for Federal unemployment relief are not included.

COL. LEONARD P. AYRES, of the Cleveland Trust Co., has completed an interesting statistical study of the course of recovery, from which he draws a conclusion. It is that while the natural forces making for recovery are active on the surface of our national economy, they are still inert at its foundations.

Most of us who are associated with the heavy goods industries which form the foundations of which Col. Ayres speaks have arrived at similar conclusion through

the impact of personal experience. While our volumes have reflected welcome percentage increases during the past two years, they have lagged in their improvement as compared with consumer goods.

The chart showing national income paid out since 1929, reproduced on this page, tells our recovery story. We are not climbing up hill as fast as we slid down. If our rate of gain during the past 20 months is not accelerated it will take us four or five years more to get back to an 80 billion national income.

The crux of the situation in the heavy industries seems to lie in the capital markets. The new corporate issues, in 1934, as Col. Ayres points out, were less than one twentieth of what they were in 1930. It is time to examine the foundations and pay less attention to the surface.

Washington would be well advised to reconsider the new laws affecting private investment in the light of national income performance.

*John H. Van Dine*

# BRITTLENESS

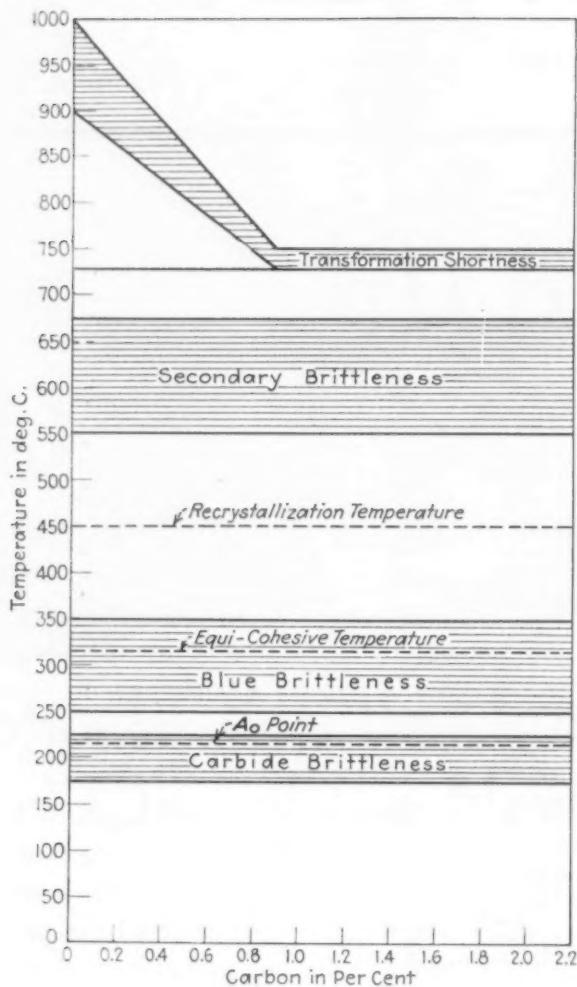


FIG. 1—These typical ranges of brittleness appear in steels tested from room temperature to 1000 deg. C.

**B**RITTLENESS is a sudden loss of ductility, and a range of brittleness is a sudden loss of ductility for a certain temperature range. When a steel is tested slightly above or below this range, the ductility is greater than that existing within it.

Four ranges of brittleness are indicated when steel is tested from sub-zero temperature to above the thermal critical range (1000 deg. C.). These ranges are presented in Fig. 1 in the order in which they are observed upon testing a series of steels from room temperature to 1000 deg. C. The four ranges that seem to exist are (1) carbide brittleness, (2) blue heat or blue brittleness, (3) secondary or recrystallization brittleness, and (4) transformation shortness. There is a possibility of a fifth range of brittleness, located at the  $A_2$  point in hypoeutectoid steel, but sufficient experimental evidence has not been obtained definitely to establish or disprove its existence. These various types of brittleness will be discussed, illustrated and explained in the subsequent pages.

The ranges and types of brittleness in this investigation were determined by means of torsion testing. The torsion machines used were designed and built at Harvard University under the supervision of Dr. Albert Sauveur. Fig. 2 shows the type of machine used in the early part of the investigation, while Fig. 3 exhibits a detailed drawing and photograph of the machine used in the latter part of this work.

The test specimens used were  $\frac{1}{2}$  in. in diameter and 4 to 8 in. long, with a center section  $\frac{1}{2}$  in. long and reduced to  $\frac{1}{4}$  in. in diameter. (See Fig. 2.) The bars were

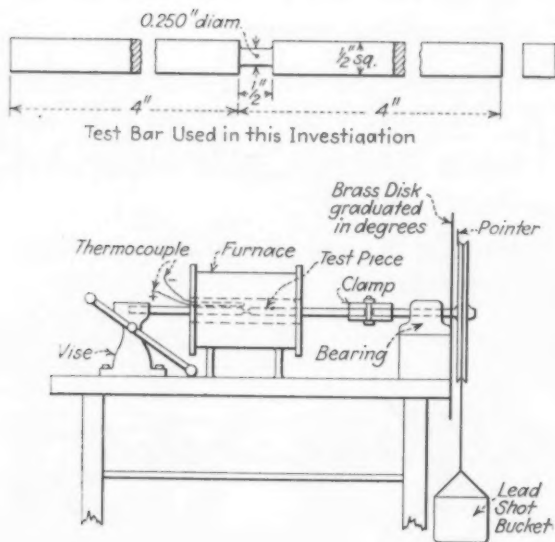
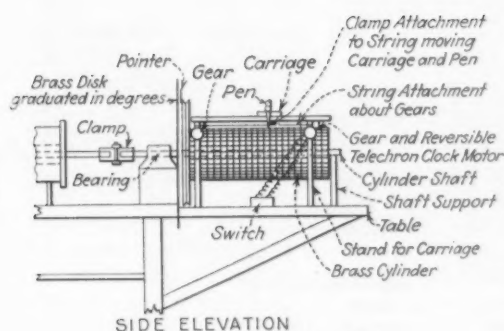


FIG. 2—Vertical sectional view of the torsion machine used in part of this investigation.

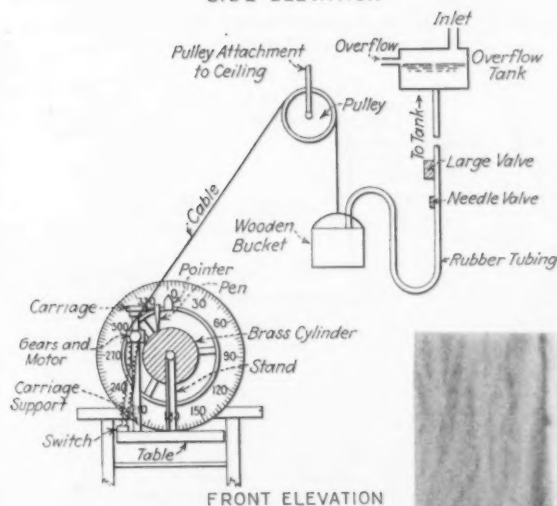
# IN STEEL

By CARL L. SHAPIRO, Sc.D.

Research Associate, Harvard University



SIDE ELEVATION



FRONT ELEVATION

placed into position between two holders. One holder was gripped in a stationary vise, while the other was clamped in a movable pulley. The reduced middle section of the bar is centrally located in a carefully controlled, electrically heated resistance furnace. Attached to the pulley is a cylinder on which a pen is drawn back and forth in a straight line by a reversible Telechron clock. The pulley, to which the test bar is held, has a cable connected and wound around its rim. The cable is passed over another pulley sus-

THE best of steel may be ruined by rolling or working it at the wrong temperature. By the same token, a poor steel will often give satisfactory results over long periods of time if its brittleness characteristics are known and taken carefully into account during the forming of consumer products. Consequently any new data on this subject can usually be put to immediate use. This treatise by Dr. Shapiro is the first of a series of three articles which will appear in *THE IRON AGE*. Brittleness in steel will be discussed at length, all the available information will be correlated, and new experimental results will be interposed to simplify and illustrate the various types of brittleness.

AT LEFT

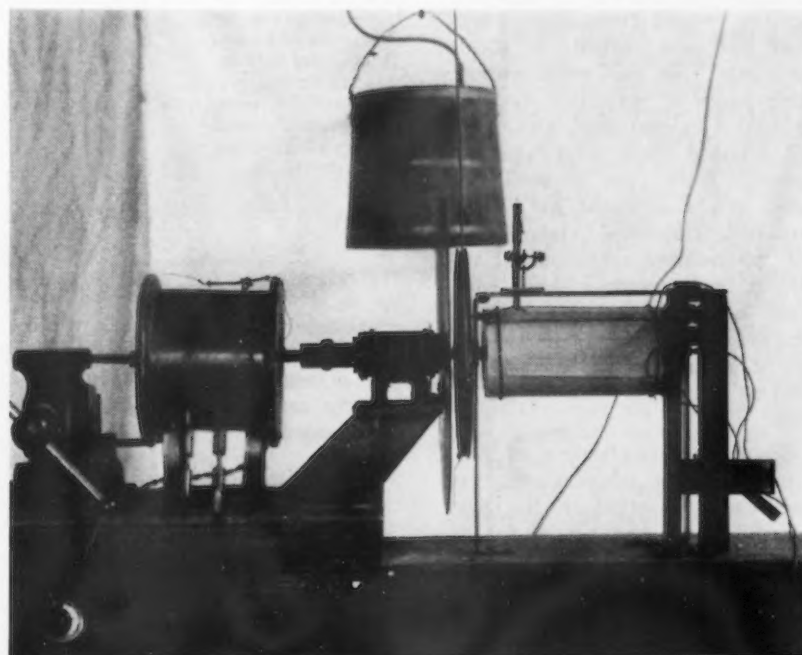
FIG. 3—Sauveur's torsion machine was modified, as shown in these diagrams, in order to secure accurate brittleness data.

BELOW

FIG. 4—The torsion machine. The details of the machine are shown in Fig. 3.

pended from the ceiling, and supports a wooden bucket. (See Fig. 3.) The water outlet is located near the ceiling and is connected to an overflow tank which in turn is supplied by the water main.

The water is run into the bucket by means of a thin flexible rubber tube at any desired rate. The rate is made constant by two needle





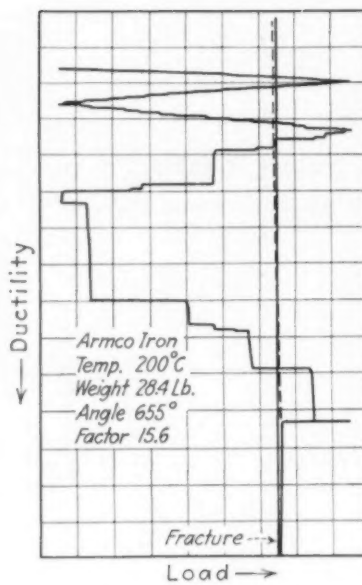
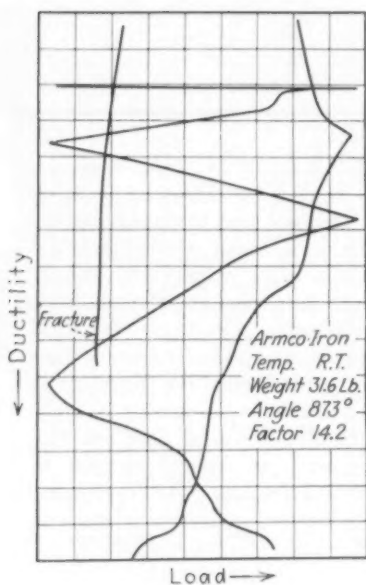
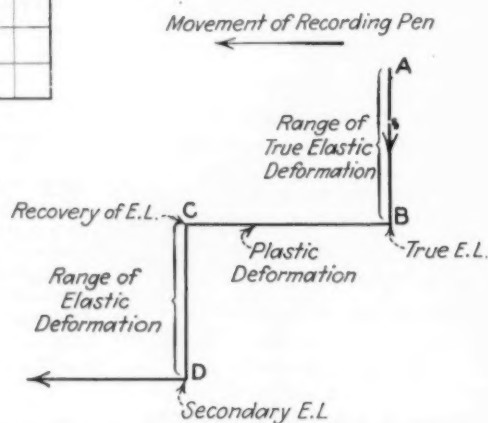
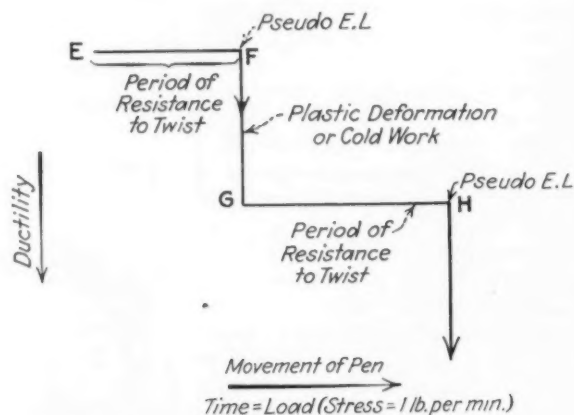


FIG. 5—Two sets of stress-strain curves for Armco iron, one at room temperature and the other at 200 deg. C. This latter curve is composed of ideal small, sharp, and well defined steps



NOTE This diagram abstracted from Dr. Van Wert's paper entitled "Blue Brittleness"

FIG. 6—Ideal three-stage cycle of stress-time diagram; (a) denotes data secured in old style machine, and (b) represents results obtained with the modified apparatus.



NOTE Arrows indicate direction of twist

valves, and once these valves are regulated the rate of loading becomes constant. Checks over a period of hours have shown that the flow rate does not vary and the actual breaking load, which is obtained by weighing the water loaded bucket, can be calculated exactly by timing the duration of the test and adding the weight of the water bucket.

The loading used in the latter part of this investigation was at the rate of one pound per minute. Previous work on other modifications was performed by means of hand loading, which was accomplished by adding fine lead shot at a constant rate of speed from a hand bucket.

The steels tested in this investigation ranged from Armco iron (0.02 per cent carbon) to steels analyzing 1.58 per cent carbon. Other types of materials, such as wrought iron, cast steel, alloy steel and nitrided steel, were also examined. Each type of steel was tested in the annealed, air cooled, quenched, sorbitized (tempered), and spheroidized conditions at the various temperatures and compared against each other. This comparison brought forth the effect of grain size and heat treatment on the physical properties of steel.

When the temperature of test is above room temperature, the specimen is inserted in the pre-heated furnace and heated for 30 min. before testing. Each test,

<sup>1</sup>Journal, Iron and Steel Institute, 1880, Vol. 1, page 1001.

<sup>2</sup>Journal, Iron and Steel Institute, 1885, page 207.

up to 400 deg. C., involved approximately two hours' work, while above this range the duration of test is regulated by two factors, namely composition and previous heat treatment.

### Blue Brittleness Investigated

The various types of brittleness will be presented here in the order by which they were known. The first range of brittleness recorded in literature, as far as the author knows, is that of blue brittleness.

In 1880, Professor Ledebur<sup>1</sup> presented a paper entitled "The Injurious Effect of a Blue Heat on Steel." In this paper he states that "the recent fracture of a pump rod of Bessemer steel was due to the fact that steel becomes brittle after being worked at a blue heat."

Stromeyer<sup>2</sup> presented a paper five years later (1885) with the same title as above. He stated that "in nearly all cases where mild steel plates failed a cursory examination brings out the fact

that the plates in question have been subjected to bending or hammering while hot. There can be little doubt that while they were worked these plates were at a blue heat, or as the smiths term it, 'a black heat.' It should by this time be well known that such treatment is the most injurious to which steel can possibly be subjected and, therefore, such failures cannot be properly regarded as unaccountable. Iron possesses the same peculiarity but, being less ductile

than steel, similar failures are not so glaring."

These two papers illustrate the fact that the phenomenon of "blue brittleness" was known many years before it was investigated. The first investigator to present some new characteristics of this old phenomenon was Howard.<sup>3</sup> The following lines are abstracted from his work: "Remarkable phenomena are displayed in the vicinity of 200 to 400 deg. F. at intervals of relaxation of the metal, and rapid stretch without increase of load, or even under slightly reduced loads, is followed by periods of abnormal rigidity."

In 1916, De Forest noted that when brasses were worked in their brittle range they gave by means of jerks or steps.<sup>4</sup> Professor Sauveur also observed this phenomenon in steels when they were worked in their blue heat range, by means of torsion testing.<sup>5</sup> Torsion tests accentuate the characteristics of the blue heat range. Sauveur described two distinct types of torsional stress-strain curves, i. e., those with a regular and smooth outline derived normally by testing above and below

temperature to above the blue heat range, taken by the constant loading water method previously described.

It will be advantageous at this point to discuss steps, their cause and significance. An excellent description is given by Professor van Wert,<sup>6</sup> who said that "the stepped stress-time diagram clearly indicates that, under a uniformly increasing load, deformation does not proceed regularly. There are periods of deformation alternating with periods of little or no (inelastic) yielding. In other words, progress towards fracture of the specimen occurs in this wise: As soon as the true elastic limit or yield point is exceeded the bar deforms a certain amount, then to all appearance and in view of its subsequent behavior it apparently recovers its elasticity (and yield point). This is followed by a probable though small elastic deformation, again yielding as loading exceeds the new 'elastic limit,' and finally this is again brought to a full stop through a second 'recovery of the elasticity.' This three-stage cycle continues until fracture ensues." A diagram of an ideal

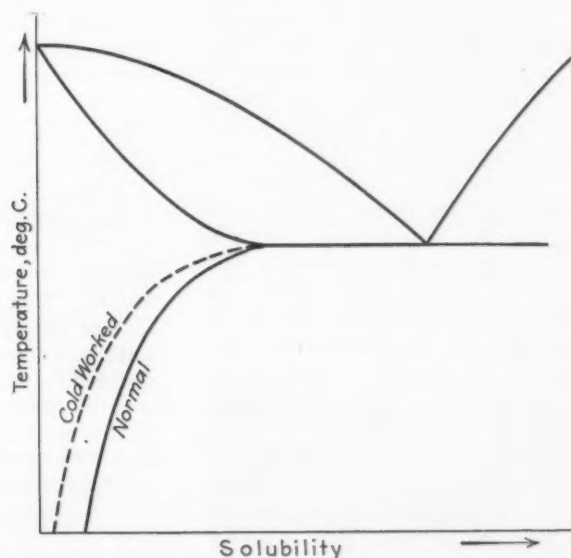
application of the load, the bar resists deformation while the pen moves across the chart horizontally in a straight line. Reaching the end of the circuit the clock reverses and the pen is drawn back and retraces itself, and suddenly deviates from its initial line and indicates the proportional limit. Passing the proportional limit the yield point is quickly reached, which is similar to tensile testing. The ductility or plastic deformation increases steadily from this point with the increasing load, and progresses continuously until immediately before failure where the bar begins to yield irregularly and shows a tendency to stop. The reason for this tendency will be explained a little later.

When Armco iron is tested at 100 deg. C. the yield point takes place quickly while the proportional limit is not very intense. On passing the yield point plastic deformation slowly occurs until another yield point or step takes place. The stress-strain curve from here on is composed of a number of small irregular steps until the middle of the third line where a larger step occurs. The resistance to slip caused by this step is sufficient to allow the metal to become elastically deformed until the load becomes great enough to overcome this resistance. Following this step two other large irregular ones take place just before failure.

These steps are not due to "give" in the machine as they are very readily observed by two methods, namely (1) a sudden drop of the loaded bucket, ranging from one inch to about four feet depending upon the composition of material, temperature and rate of test. The falling bucket suddenly stops and remains stationary until the constantly increasing load is sufficient to cause the metal to yield again; and (2) the drum attached to the pulley, on which the pen traces a straight line on the graph paper, is connected directly to the test bar and cannot move unless the test bar yields. Outside influences, such as vibration, shock or swinging of the bucket to and fro, do not cause the test bar to yield and therefore cannot be the cause of steps.

The stress-strain diagram of the Armco iron test at 200 deg. C. is remarkable (see Fig. 5) in that it indicates that the bar yields

FIG. 7—Cold work may decrease the solubility, as shown in this curve.



the blue heat range, and those presenting a decided "stepped" appearance, which are invariably produced when twisting is done within the range of blue brittleness. Fig. 5 shows a series of stress-strain curves from room

three-stage cycle is shown in Fig. 6. Fig. 6 (a) denotes a step in the old type machine while 6 (b) represents data obtained in the modified machine (Fig. 3).

The steps, their cause and significance can best be explained by describing the stress-strain diagrams of Fig. 5. The first interpretation given will be that of the room temperature curve. On the

<sup>3</sup> Watertown Arsenal, Watertown, Mass., 1880, page 248.

<sup>4</sup> Proceedings of A.S.T.M., XVI, Part II, 1916, page 455.

<sup>5</sup> A.S.S.T., 1930, page 410.

<sup>6</sup> L. R. Van Wert, A.I.M.E., 1931



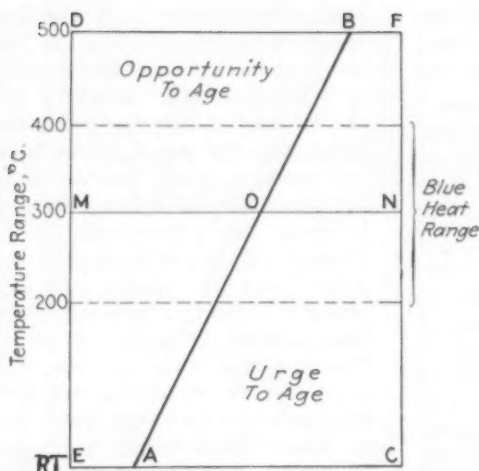


FIG. 8—Diagram to explain the theory of the blue heat phenomenon, as advanced by Professor Sauveur.

entirely by means of steps or a series of plastic and elastic deformed curves. This is an ideal stress-strain diagram, as it is composed of small, sharp and well defined steps. This type of diagram is typical of all metals when they are tested near, or at, their range of maximum blue brittleness.

#### Steps Probably Caused by Precipitation

The 300-deg. specimen shows a marked yield point with a number of small steps preceding two large ones before fracture. Steps are still observed in the 400-deg. test but they are not so sharp and well defined as in the previous tests. This is due to the fact that the resistance to slip is rapidly diminishing with increasing temperature. The loss of slip resistance is caused by the agglomeration of the precipitated particles. The 500-deg. stress-strain diagram shows that the ductility increases steadily with the application of the load until failure ensues.

The above brief description of the torsional stress-strain diagram illustrates the significance of steps, and points out that the cause of steps may be due to precipitation. Precipitation necessitates a reaction between elements, compounds or solid solutions, provided that limited solubility in each other is present which increases with temperature (Fig. 7). This change in solubility on cooling, may cause the solvent lattice to become supersaturated with respect to the solute and will pre-

cipitate it out along its crystallographic planes and axes. The planes and axes upon which the particles are precipitated, seem to be determined by the lattice of the solute and solvent metal. Another factor which must be considered before the cause of steps can be explained is the effect of cold work upon the solvent lattice. Cold work distorts the lattice and will tend to cause a decrease in its solubility. Theoretically, if the solute atom remains within the continually distorted solvent lattice, a state of unsaturation will pass into the supersaturated condition with precipitation. In other words, the effect of cold work may cause the solubility line of the equilibrium diagram (Fig. 7) to move to the left, indicating a decreased solubility.

Returning again to the stress-strain diagram of Fig. 5, a tendency to step is observed at room temperature just previous to failure. This may be attributed to the result of cold work on the iron lattice containing some 0.006 per cent carbon in solution. The amount of cold work appears to be sufficient to distort the ferrite lattice to create a state of supersaturation in respect to the carbon content retained in its interstices. The supersaturated lattice then rejects the precipitated particles in its crystallographic planes and axes, and this may cause the slight interference to slip as is recorded in the stress-strain diagram.

As the temperature is raised, the solubility of carbon in iron increases and tends to promote a clearer defined step, when precipitation occurs, as the increased solubility offers more carbon to be rejected out of the lattice. This idea seems to be borne out in a 100-deg. C. specimen. In the 200-deg. test, the conditions, solubility and temperature, become still more favorable for precipitation. As soon as cold work deformation is begun, the ferrite lattice appears to become saturated and precipitates carbon, in the form of iron carbide, within its lattice's planes. These rejected particles are sub-microscopic and are in a critical

dispersed condition, in sufficient quantity to cause immediate resistance to slip as soon as they are precipitated. Slip is then impeded until the breaking load becomes sufficiently great to overcome this slip resistance and cause plastic deformation.

During the interval that the load is increasing and the metal is being elastically deformed many factors may be at work to break this resistance to slip, caused by the precipitated particles. The particles themselves might try to undo their own handiwork, as they are in an unstable condition, and may try to reach equilibrium among themselves by agglomeration. The same rule that applies to solvent and solute may possibly be applicable here, as the larger precipitated particle will have a tendency to absorb the smaller, and the less cold worked particle will try to absorb the more distorted particle. The ferrite lattice might also try to regain equilibrium conditions, while being elastically deformed, and will tend to eliminate some of the effect of cold work deformation. The lessening of lattice distortion causes the metal to become in an unsaturated condition, promoting a tendency for the lattice to reabsorb some of the precipitated particles that it previously rejected within its planes and axes.

While the above hypothetical factors are taking place, the load is constantly being increased and is soon sufficient to undermine the effect of precipitation, causing the material to become plastically deformed. This deformation creates further precipitation, which is always less than the preceding step, and reduces further resistance to slip, as denoted by the smaller elastic portion of each subsequent step. This cycle of events repeats itself until failure occurs.

Professor Sauveur<sup>7</sup> explains the blue heat phenomenon simply and very clearly on the basis of precipitation, or age hardening, by means of a single diagram (Fig. 8) discussed in the following paragraph.

"The urge to age resulting from a certain amount of deformation performed at room temperature may be represented by the distance AC, while the opportunity to age is represented by AE. It is small because of the rigidity of the steel at room temperature. Time, there-

<sup>7</sup> *Metals and Alloys*, August, 1932.



fore, is required for aging to take place, as rigidity has to be overcome. For the same amount of work, performed at increasing temperature, the urge to age decreases, but the opportunity increases. The former may be represented by the distance *ON* in the blue heat range, the latter by the distance *MO*. The conditions are now what they should be to result in precipitation immediately following deformation; hence the blue heat phenomenon. At still higher temperatures, while the opportunity to age increases, the urge to age is so slight that aging does not take place. At 500 deg. C. the urge to age may be nil as we are now approaching the requiaxing temperature."

It is believed that blue brittleness is a precipitation phenomenon and is caused by the rejection of a solute out of a solvent lattice. The solvent lattice in this case is iron, while the solute may be either carbon, oxygen or nitrogen. The cause of precipitation in normal carbon steels may be attributed to carbon, while in carburized and nitrided steels, to oxygen and nitrogen, respectively. These elements, if present, may either assist or retard each other. In other words, oxygen, if present, may possibly retard or accelerate the carbon precipitation while carbon, if present, might influence directly the aging effects of oxygen and nitrogen. The mechanism of blue brittleness, which is described above, is believed by many to be identical with that of aging.

It is commonly believed that maximum stepping or rather the temperature that reveals the largest steps indicates the blue heat range. This may be attributed to the fact that the greatest breaking load is usually recorded at the temperature at which the largest steps are observed. But on the other hand, the minimum angle of twist (ductility) is always recorded at the temperature that yields the finest, sharpest, and greatest number of small steps, and if blue brittleness is an aging phenomenon the minimum angle of twist should be the criterion for maximum blue brittleness for the following reasons: (1) Aging is a precipitation phenomenon, and maximum resistance to slip occurs only when the particles are precipitated at a temperature at which agglomeration does not take

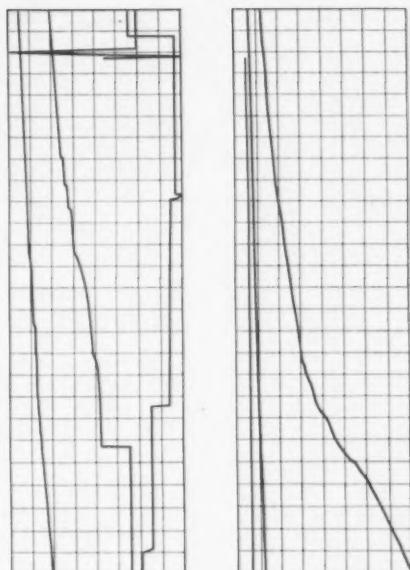


FIG. 9—Stress-strain diagrams showing steps obtained in eutectoid and hyper-eutectoid steels. At the left is (150 deg. C.) an 0.87 carbon steel, and at the right (200 deg. C.) a 1.20 carbon steel.

place faster than precipitation. (2) Precipitation interferes with slip or ductility and the temperature at which greatest slip resistance occurs should be the criterion of blue brittleness. (3) As a general rule the maximum breaking load occurs in constant loading tests at a temperature greater than that at which the minimum angle of twist (ductility) is recorded. This is due to the fact that the ductility increases quickly, once the minimum angle is passed, while the strength remains practically constant. Thus the time factor (duration of test) is prolonged, creating a greater breaking load since the rate of loading is constant. The importance of deter-

mining a method for blue brittleness will be illustrated in the discussion of some torsional results.

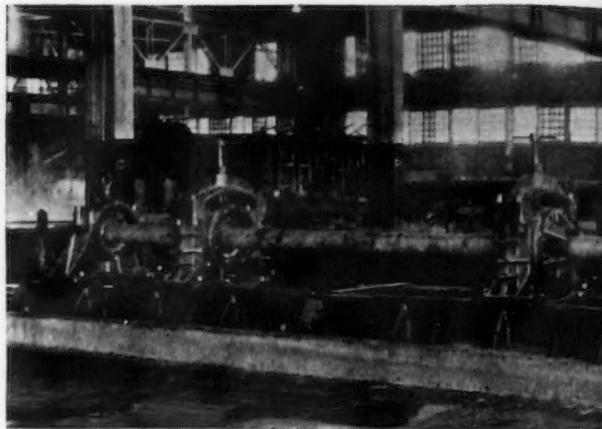
Steps up to the present investigation have only been reported in relatively pure irons and in hypoeutectoid steels up to about 0.40 per cent carbon, although they have been observed in other age hardening materials. The conclusion of various investigators was that steps, which are observed in iron and steel, are a characteristic of ferrite and are only present if ferrite is in sufficient proportion to warrant an increase in strength, as is demonstrated by slip, and slip resistance, or by steps, when precipitation occurs. The results of this investigation confirm the above theory and further indicate that steps are a characteristic of ferrite. The amount of free ferrite that is available for hardening by precipitation in the blue heat range determines the form, size, and number of steps. As the carbon content increases, the amount of free ferrite available for age hardening lessens and reduces the ductility which results in finer, sharper, and smaller steps. Steps in high-carbon steels are smaller than those in medium, mild or low-carbon steels and they decrease in the same order: medium, mild low-carbon steels. Steps have been obtained in eutectoid and hyper-eutectoid steels and are illustrated in Fig. 9.

*Editor's note: Next week Dr. Shapiro will present the second of this series of three articles on brittleness in steel. Secondary brittleness, transformation shortness, and carbide brittleness will be discussed at length, and new experimental data will be presented on all three of these subjects.*



THE Chicago Great Western Railroad has been one of the first to put Diesel powered switching engines to work. Here is one of them alongside of the conventional steam switcher. The Diesel locomotive generates 800 h.p., exerts a 44,000 lb. draw-bar pull and can go 45 miles an hour when the day's work is done and the boys want to go home.

FIG. 1—Full size testing machine  
at Spang, Chalfant & Co., Am-  
bridge, Pa. The oil well drilling  
pipe specimen is  $8\frac{5}{8}$  in. in diam-  
eter and 25 ft. long. The machine  
is of rotating beam type, using  
constant deflection.



## Dynamic Strength of Machine Parts

laboratory will be the development of methods of attack on various parts of the problem, some of which are here discussed.

Full size fatigue testing machines are used in some industries. Two are here illustrated, one possibly the largest, and the other a small one. At one end of the scale, Fig. 1 shows a machine built by the Spang Chalfant Co., Pittsburgh, for applying reversed bends at constant deflection to  $8\frac{5}{8}$  in. diameter oil well drill pipe. The other illustration is of a rotating beam fatigue test at the laboratory of the American Chain Co. applied to a 0.01 in. diam. stainless steel wire. This wire is bent 90 deg. about a pulley of appropriate diameter to give the desired fiber stress and is rotated about its own axis at 15,000 r.p.m. The pulley has a polished groove in which the wire rests, held in place by guides at the tangent point. A slight stream of oil lubricates the wire and helps to hold it in place.

In both these cases the endurance limit of the product, and the effect of changes in surface, in method of manufacture, and in the material can be studied quantitatively. The highest efficiency would be shown by the method of preparation of the finished part which resulted in an endurance limit

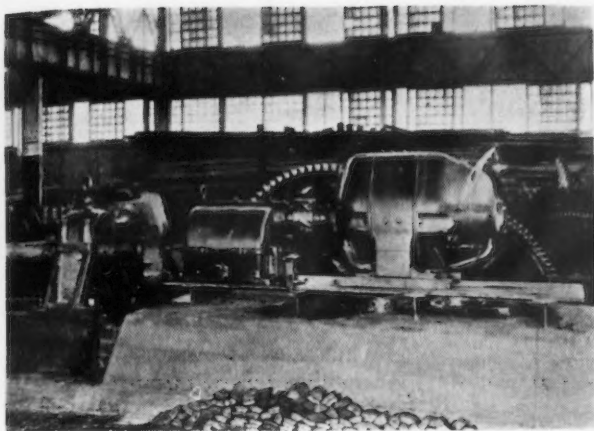
THE important influence of seams, grinding checks and other surface imperfections in machine parts subject to dynamic stress is interestingly outlined by Dr. De Forest in this paper, which was presented under the title of "Surface Integrity and Dynamic Strength," during the recent annual meeting of the Society of Automotive Engineers at Detroit.

Even if insignificant in depth and entirely invisible, surface cracks whether inherent in the metal, as in seams, or added in processing are found to lower greatly the dynamic strength of steel. Cracks may also be in-

equal to that obtained on a test specimen. In wire the structure and mechanical properties are a function of size so the test specimen must be made from the wire itself, and with cold drawn wire the surface cannot be removed without changing the distribution of internal stress. Wire, therefore, must be tested in the full size form, and a separation cannot be made between the more fundamental

THE usual definitions of strength and the figures used in the [machine design] formula are derived from static tests applied to standard test specimens. Fatigue tests and impact tests, as well, are often taken into account, but in all cases the properties of the test specimen are a function of its shape and size and method of preparation, and the figures used must be modified by experience to fit the particular case involved. The relation between test specimen results and full size results to determine the form factor for various typical parts and materials is highly important.

To increase our knowledge of this field the Massachusetts Institute of Technology has established a laboratory for the study of the dynamic strength of materials, particularly in the form of full size parts. Much of the work of the



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## Affected by Quality of Surface

cient, caused by improper design of the machine part.

Applications of the Magnaflux test for detecting surface imperfections are cited, one being the periodic inspection of bus parts by an operator of a large fleet. Other less known and less easily controlled variables are also outlined. In discussing damage resulting from machined surfaces, Dr. De Forest points out that the direction of tool marks should be parallel to the stress and not perpendicular—a fact said seemingly to be rarely recognized outside the aeronautic industry.

properties and the effect of surface and methods of preparation, heat treatment and cold drawing.

In the full size test of drill pipe, fatigue specimens can be cut from the wall of the pipe, and the steel itself rather than its treatment compared with results on other similar specimens.

It is not always realized that dynamic strength as differentiated from static strength is frequently

a matter of the quality of a stressed surface. A diamond scratch a thousandth of an inch deep can lower the fatigue and impact strength of a piece of glass in the proportion of 100 to 1. A crack of insignificant depth and often totally invisible will greatly lower the dynamic strength of steel.

A test method has been discovered which will locate such discontinuities. If a steel surface is magnetized in such a way as to prevent the formation of an external field and the surface is lightly dusted with finely defined magnetic particles, these particles will indicate a crack or discontinuity of the metallic structure even though the defect is of the order of a few tenths of a thousand of an inch in depth. In hard materials such as are used in ball bearings grinding cracks occasionally appear and are particularly dangerous. They reduce the fatigue strength of the finished part in a ratio of the order of 5 or 10 to one, but at the same time they only reduce the static properties by a small quantity. Cracks may be present in a new part as in the case of the forging steering arm shown in Fig. 3, or the grinding cracks in Fig. 4, or they may be incipient fatigue cracks, caused by improper design leading to concentrated stress, or

by internal stress, or damaged surface.

The Magnaflux test here described has been in use for a period of 2½ yr. on the periodic inspection of parts from a fleet of motor buses operated by the Surface Transportation Co., Bronx, New York. In the course of this time some 5000 parts have been inspected and as a result 15 per cent of the total number, or 750 danger points, have been removed. The study of parts which have failed in service under fatigue conditions and the development of fatigue cracks under test conditions indicate a slow growth of the crack during the life of the specimen. The defect is present during the last half of the life of the part. It is exceedingly fortunate that these fatigue failures proceed so slowly, for it enables us to apply periodic inspection with good hope of catching the damaged part before failure has occurred. The ap-





FIG. 2—Fatigue machine employed by American Chain Co., Bridgeport, Conn., for testing 0.010 in. diameter wire. It is of rotating beam type, constant deflection. Wire is bent 90 deg. around a slowly revolving pulley and is rotated about its own axis at 12,000 r.p.m.

pearance of the defective parts found in this bus inspection indicates that the majority of failures are the results of poor design leading to concentrated stresses and a large part of the remainder are due to local surface conditions which could easily be cured.

The failures due to defective materials as such and which would be indicated by static types of test are negligible. This is an important point. It shows that the designing engineer has issued specifications for steel analysis and heat treatment which have been properly lived up to by the heat-treating department, and properly checked by the inspection department, but in the presence of dynamic loads, either the design or the strength of the part was insufficient. Insufficient fillets, notches, corners (stress accumulates in corners like dirt) are bad design. Scaled surface, tool marks, rough forgings, internal stress, lower the fatigue value of the steel far below its proper figure, and no specifications cover the resulting loss of strength.

Figs. 3, 4 and 5 illustrate cracks found by the Magnaflux test, and Fig. 6 the magnetizing equipment.

#### Small Seam Found to Shorten Life of Valve Springs

An investigation leading to diametrically opposite conclusions was also the result of application of the Magnaflux test. In this case valve springs on an airplane engine were giving difficulty with service failures. A most rigorous inspection of the mechanical properties of the wire and the surface appearance of the finished springs did not result in improvement. Even with a rejection of 50 per cent of the total product failures still occurred in about the same proportion. At this time overloading was suspected and a careful examination made with a stroboscopic illumination to measure the flutter effect. The type of wire was changed and the heat treatment varied several times without any great effect on the number of failures. It was found, however, when the Magnaflux test was applied, that the springs broken in service always showed a slight longitudinal seam associated with the fatigue failure. The method was therefore used for in-

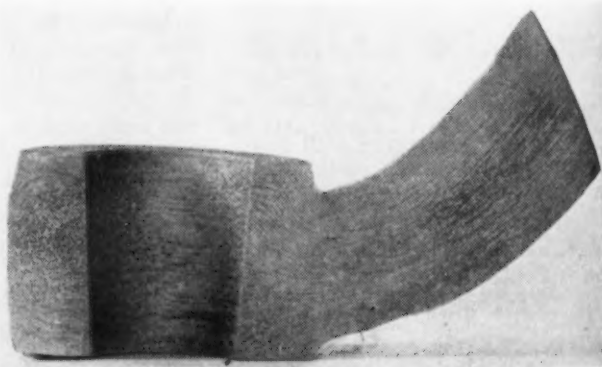
pecting springs and the results checked on a special fatigue machine. It was found invariably that a small surface seam led to a short fatigue life and that in the absence of this defect variations in mechanical properties of the spring and the heat treatment had insignificant effects.

#### Other Variables Less Easily Controlled

While surface cracks, whether inherent in the metal as in seams or added at the final operation as by grinding, are very dangerous to the life of the part, there are other less known and less easily controlled variables. The chief of these is the condition of surface apart from actual discontinuities. A long investigation of leaf springs at the National Physical Laboratory has indicated that at least 50 per cent of the fatigue strength is lost if the original hot rolled surface is allowed to remain on the steel. Even the surface resulting from normal heat treatment is seriously defective from a fatigue point of view. The most important source of this damage seems to be decarburization and the resulting intergranular penetration of ferrite between grains of harder metal. As in the case of surface cracks the damage done is a question of the sharpness of the notch effect rather than its depth. A better appreciated type of damage is that resulting from machined surfaces. It is well known that the direction of tool marks should be parallel to the stress and not perpendicular, but from general observation this knowledge is rarely used in practice outside of the aeronautic industry. The importance of surface conditions on full size parts can only be brought out by tests which include the many variables occurring under manufacturing conditions.



FIG. 3—Forging defect in heat-treated, steel steering knuckle at 100X. The crack was found by means of the Magnaflux test.



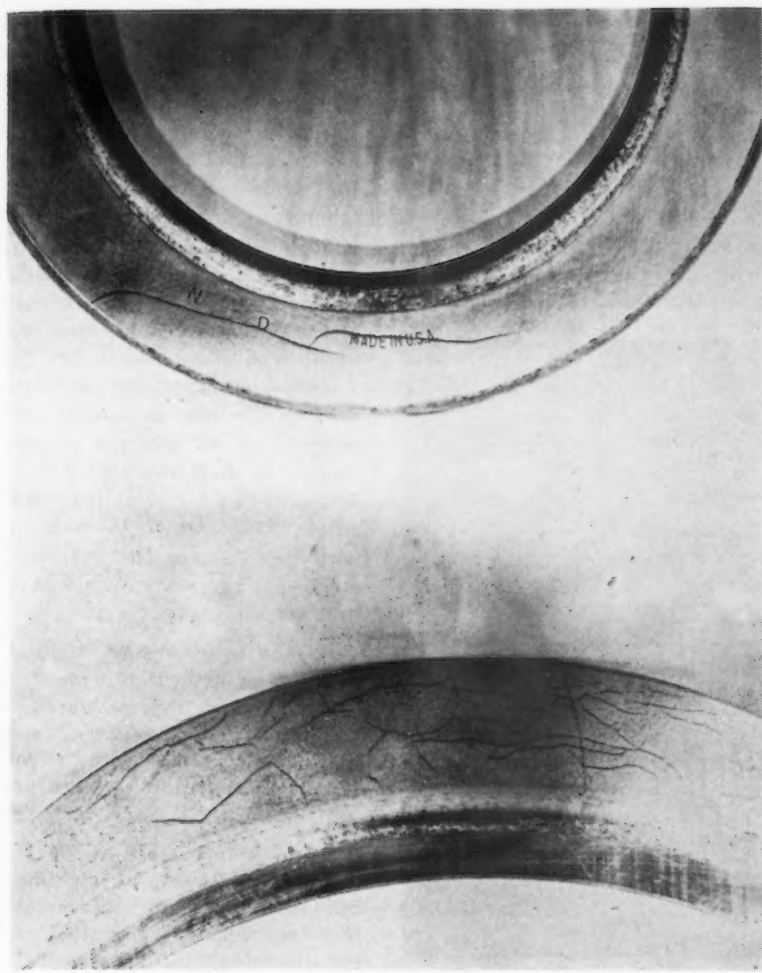


FIG. 4—Magnaflux test shows otherwise invisible grinding cracks in ball bearing raceway.

Another most important variable influencing dynamic strength is the amount and distribution of initial stress. There is at the present time no general method of attacking this problem. Changes in size due to removing thin layers have been used to study test specimens, but the results indicate only the stresses acting in various directions over large volumes of metals and do not indicate the micro-stress conditions between individual grains. In materials such as brass, subject to corrosion cracking, the stress condition can be studied chemically by the susceptibility of the finished part in an attack by mercury or ammonia. In the case of steel deep etching acts in a somewhat similar manner but for internal stress this test has not been sufficiently developed. It is well known that the magnetic properties of steel are much influenced by the conditions of internal stress and it is hoped that this form of stress may be de-

veloped into a useful tool for the attack of this problem.

During the last ten years a vast amount of fatigue testing in the presence of various corrosive agents has been carried on. The

results indicate a disturbingly great effect on the dynamic strength of metals when corrosion takes place in the presence of fluctuating loads. The corrosion need not show itself either in the form of a stain or a tarnish, much less in the grosser forms which cause a loss of weight or actual rusting. The effect of salt spray on stainless steel can reduce the endurance strength by 50 per cent after 10,000,000 reversals of stress and further testing indicates that under at least some conditions there is no endurance limit whatever and failure will occur at any load provided a sufficient number of repetitions are applied. At present corrosion fatigue is properly studied on test specimens but there are many cases in which the test method should be applied to full size finished parts.

#### Methods Available for Measuring Fluctuating Strain

The points mentioned so far are all in connection with the unknowns on the material side of the [machine design] equation: applied load = strength x factor of safety. Under very many conditions particularly in high-speed machinery the loads applied are as unknown as the methods by which they are resisted. It is generally recognized that when the rate of application of load approaches the natural period of vibration of a part, resonant vibrations are set up and the resulting strains are more nearly a function of the rate of application of the load than the load itself. In all except the sim-

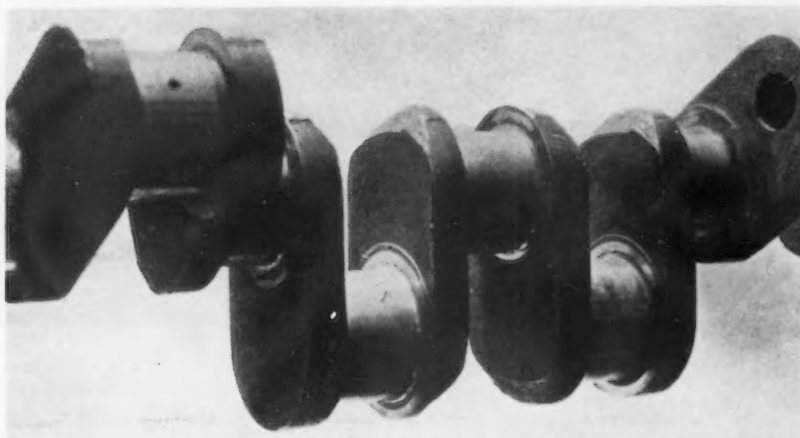


FIG. 5—Incipient fatigue cracks in crankshaft found in periodic inspections at the Surface Transportation Co.



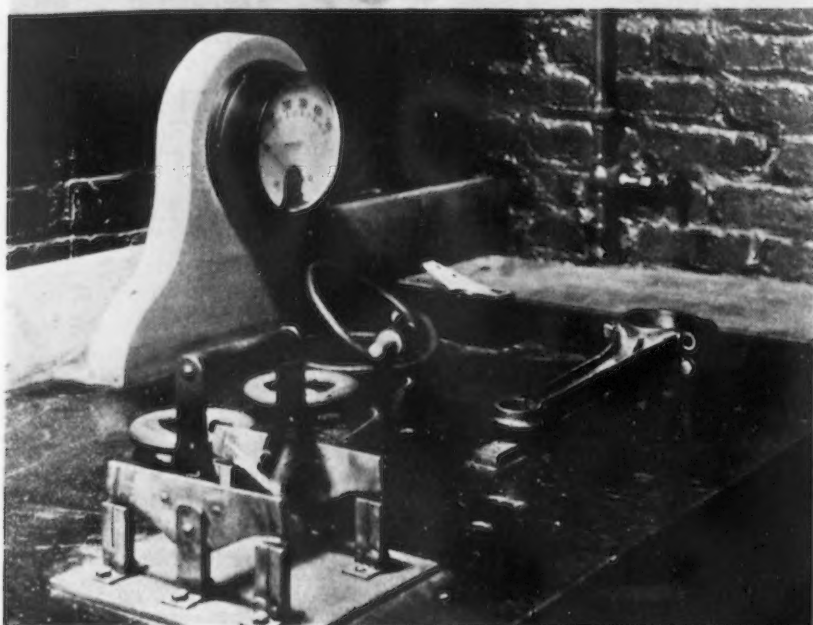
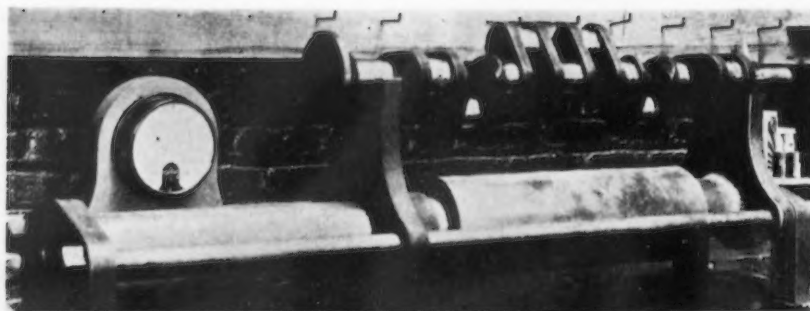
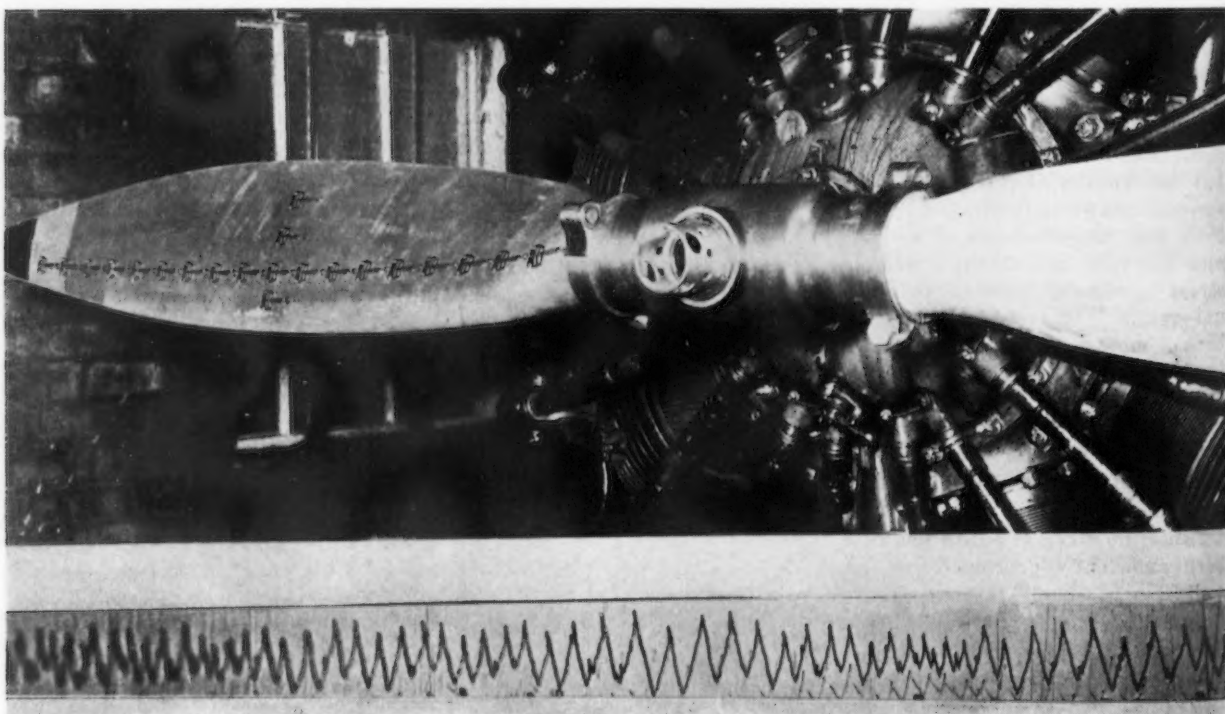


FIG. 6 (Above)—Magnaflux test equipment employed by the Surface Transportation Co.

FIG. 7 (Below)—Propeller blade with scratch recording gages for stress analysis under working conditions. The equipment is installed at the plant of the Hamilton Propeller Co. The scratch record is from a service test on airplane propeller showing resonance and interference.



plest cases, two or more types of vibration exist simultaneously and the reinforcing and interference of these vibrations lead to serious variations in stress. Methods are available for measuring fluctuating strain conditions, such as the telemeter and magnetic strain gage, recording electrical forces on an oscillograph after amplification. A simple and inexpensive method of attacking this vital problem is illustrated in the Figs. 7 and 8 showing the de Forest Scratch Recorder as used in stress analysis on an airplane propeller blade. A description of this use appeared in the *S.A.E. Journal* for July, 1934, and it is mentioned here to illustrate the various instruments necessary to attack the problem under discussion.

At the present time many instrumental methods are under development and must be applied to full size working problems in order to complete as rapidly as possible their evolution into the most convenient form.

The new laboratory at the Massachusetts Institute of Technology has been established to correlate the experience of practical men, the literature in many fields of science concerning mechanical properties and to develop and apply test methods designed to fill the gaps in our present knowledge of dynamic strength.



# New Silicon Steel Commends Itself To the Electrical Industry

By T. W. LIPPERT

*The Iron Age, New York*

EFFICIENT telephones materialized over a decade ago with the discovery of Permalloy. This unique nickel alloy was rapidly adapted to other electrical equipment which required high electrical permeability in extremely weak magnetic fields with concomitant low hysteresis loss.

Permalloy, however, saturates quickly and thus is useless in high magnetic fields such as are encountered in motors and transformers. Therefore considerable significance is attached to a recently developed silicon steel, produced by N. P. Goss and the Cold Metal Process Co., Youngstown, Ohio, which possesses characteristics equivalent to those of Permalloy in the high flux density ranges as well as in weak fields.

This new steel, described herein, has magnetic properties remarkably similar to those of a single crystal. Its permeability is very high throughout a broad range of magnetization, varying from weak earth fields up to the saturation point of about 20,000 gauss. But of even more importance are the low hysteresis losses throughout this range. Such electrical characteristics can be translated into economic values, it is stated, as motors and transformers can be made smaller, with less weight and at a reduced cost, and, in addition, power losses are reduced to a minimum level. Thus, both the consumer and distributor of electrical current can secure a sizable monetary saving with improved operation efficiency, it is said, through the use of this uniquely processed steel.

IN the selection of a magnetic steel for electrical equipment there are five properties which must be considered. The first is the ease with which it may be magnetized, a quality known as *permeability*, which is measured

by the ratio of the flux density to the magnetizing force which produces it. The second property is the continuance of the magnetized condition when the magnetizing force has been removed. This quality is measured by the *residual*

magnetism, that is, that value of flux density remaining in a completely closed core of the material when a given magnetizing force is removed. The third quality is the *coercive force* — the magnetizing force which must be applied in the opposite direction to remove the residual magnetism.

As a magnetizing force changes, the flux density lags behind in a manner suggesting that unit magnetic elements of the steel resist being rearranged. This phenomenon, called *hysteresis*, results in what is known as *hysteresis loss*. This loss is designated as the energy used up when a magnetic material undergoes a complete reversal in magnetization. Another loss which is evidenced under the same condition arises with the existence of *eddy currents* which are self-induced within a magnetic core when it is energized by an alternating current. Both the hysteresis loss and eddy currents appear as heat in electrical equipment.

In this new Goss cold-rolled low-silicon electrical strip steel, the

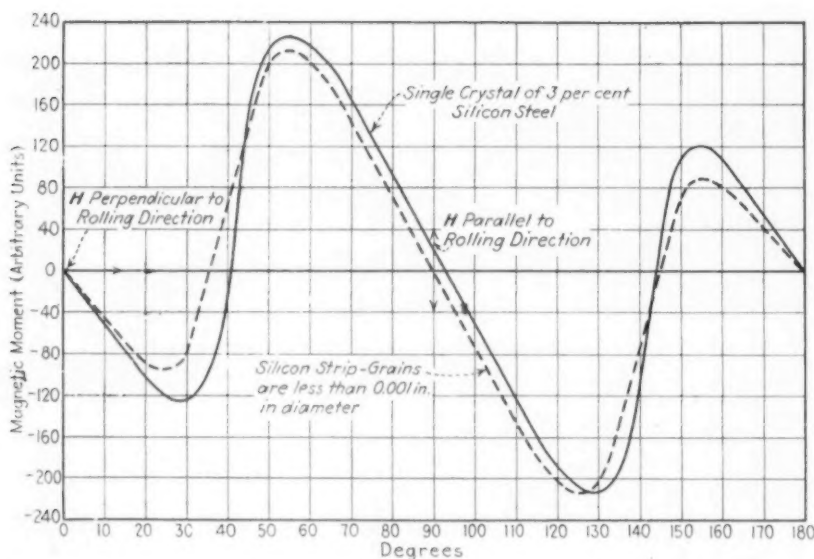


FIG. 1.—Torsion magnetization characteristics of Goss silicon steel conform closely with the characteristics of a large single crystal. Several silicon steel specimens have displayed a magnetic moment even greater than that shown here for a single crystal.

electrical resistivity is high. As a consequence the eddy currents are greatly decreased, and the material is therefore very adaptable for uses in cores of alternating current apparatus. The desirable properties of this strip steel are obtained by using a low silicon content and a proper distribution of hot rolling, heat treating and cold rolling, and the whole idea is based on a radical departure from present-day theories regarding the ferro-magnetic properties of single crystals and fine grain aggregates.

The simple cold rolling of silicon steel is not new. Such steels have been cold rolled during the past 15 years or more, but only at low

speeds and through the use of frequent intermediate anneals before the final gage could be obtained. The resulting product usually did not have the best magnetic characteristics. Due to the inherent difficulty of cold rolling and the unsuitability of the final product, many silicon steel manufacturers have been content to produce silicon steel in sheets by the conventional hot pack rolling method. In this new process, however, the Cold Metal Process Co. is able to cold-roll silicon steel as rapidly as 1200 ft. per min. in substantial widths. Of great importance is the realization that too much credit should not be ascribed to the part

played by the cold rolling of this new material, as the proper hot rolling and heat treatment in the process account to a great degree for the excellent magnetic properties.

### Samples Tested Magnetically

To determine the electrical properties of this new silicon steel, a simple torsion magnet is used. This method was originally developed by P. Weiss to study single crystals. A single crystal or fine-grained silicon steel aggregate in the form of a thin disk, about the size of a dime, is suspended in a magnetic field by means of a torsion suspension. The magnetic field is rotated about the disk, which is parallel to the floor, and at regular intervals the deflection of the couple is observed by means of a telescope and scale. The suspension is calibrated by means of a single crystal of silicon steel, and the deflections are plotted against the various angle readings (see Figs. 1 to 4).

When the direction of magnetization coincides with the path of easiest induction, no deflection can be observed. As the magnet is gradually rotated past the point of zero deflection, the crystal has a tendency to follow the field of the magnet and is only prevented from doing so by the restoring force of the couple. The maximum deflection is, therefore, only limited by the stiffness of the suspension fiber. The maximum deflection on either side of the zero positions can be observed, and the magnitudes of these deflections are proportional to the magnetic moment of the crystal.

Tests of this nature are shown in Fig. 1. The one curve shows the ideal result obtained with a single crystal, and the other curve amply illustrates the close approximation to this ideal which is obtained with the new silicon steel. It is evident that both the single crystal and new silicon steel have two positions wherein magnetization is a maximum, namely in a direction perpendicular to the rolling direction and parallel to the rolling direction.

To illustrate how uniform the magnetic structure of silicon steel made by this process actually is, a specimen for a torsion magnet test was removed at regular intervals from a large strip of the material, and it was found that the magnetic

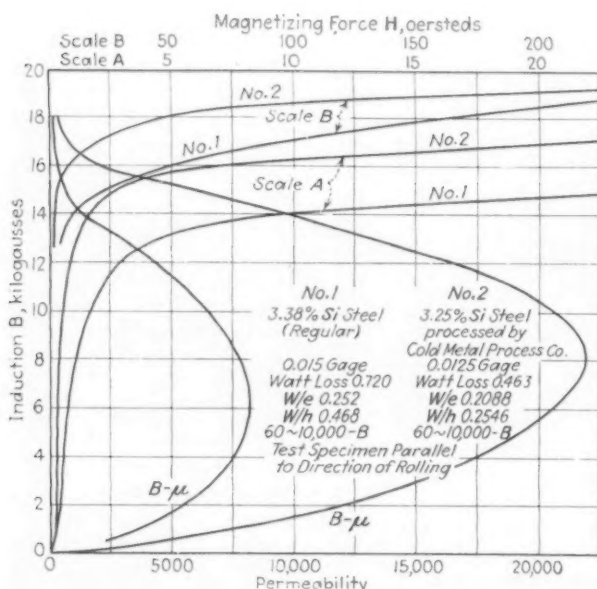


FIG. 2.—Comparing the permeability and magnetization curves of Goss processed electrical steel with conventional hot-rolled silicon steel of the same chemical analysis. These data were determined by J. Luby of Follansbee Steel Co.

moment or maximum deflections did not vary more than 5 per cent throughout the entire batch of steel, and the path of easiest magnetization always coincided with the direction of rolling. This latter characteristic is of considerable importance.

A complete study has been made of various hot-rolled sheets made by the leading producers of high-grade silicon steel, and it was found that in case some preferred orientation did exist the maximum magnetic moment was usually of very small magnitude when compared with a hot-rolled sheet having no preferred orientation. However, in all of the silicon sheets made by the hot rolled method, the magnitude of the magnetic moment was found to be very small. Therefore, such steels do not have single crystal characteristics.

### Annealing Not Sufficient

In Fig. 2 the permeability and magnetization curves obtained with the new material are compared with the regular hot-rolled sheet as made today. The watt loss for the new silicon steel is comparatively very low. In the same figure, separate hysteresis and eddy current losses are shown. The data in Fig. 2 well illustrate the many differences which exist between the regular hot-rolled sheet, which does not have single crystal characteristics, and one made by the Goss controlled process.

The object of the data shown in Figs. 3 and 4 is more adequately to show the need of integrated hot and cold rolling and annealing practices in processing the new electrical steel. Fig. 3 (1) is a torsion magnetization curve for ordinary cold-rolled silicon steel. Although the magnetic moment is quite large the strains in the material naturally result in a large coercive force and a high watt loss. But if the cold-rolled material is annealed, the magnetic moment data are undesirable, as shown in curve 2 of Fig. 3.

On the other hand consider Fig. 4, which shows data on a sample which had been taken from alongside the sample for which the data are given in Fig. 3. In this case the annealing of the cold-rolled material elevates the magnetic moment.

Thus it is evident that a simple

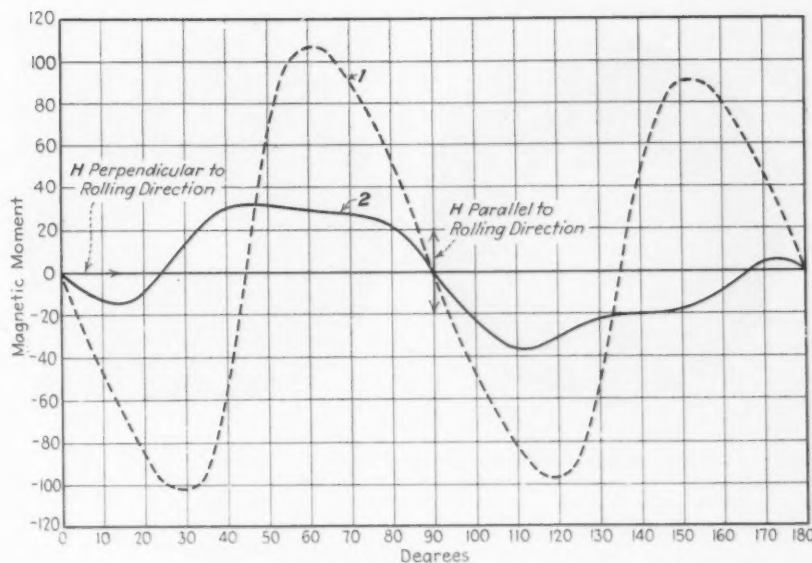


FIG. 3.—Curve 1 is a magnetization curve of ordinary cold rolled silicon steel. Curve 2 is the same steel annealed at 2000 deg. F. for 3 min. Note the drastic and non-uniform change in magnetic properties produced by heat treatment.

heat treatment does not suffice to produce a magnetically desirable silicon steel. In the Goss processed steel, the hot and cold rolling and annealing are all carefully controlled and integrated; otherwise the looked-for magnetic characteristics cannot be secured. The Goss processed steel exhibits one peculiar characteristic, namely, the magnetic moment is relatively very low in the cold-rolled material prior to the final anneal. After annealing the moment is elevated to the shape shown in Fig. 1. Following this final anneal the material not only has a high magnetic moment, but also has a very high permeability and a total watt loss often as low as 0.35 watts per lb. At the present time, several in-

dependent investigations indicate that this watt loss may be lowered considerably. As the manufacturing process is successively refined, this steel should be commercially available having a watt loss five to 10 points below 0.35.

At first thought it could be considered that the single crystal properties of this new silicon steel are due to preferred orientation. In Fig. 5 a Laue diffraction pattern of the new product is shown, and to make the results as conclusive as possible the specimen was moved at regular intervals so as to bring as many grains into the reflecting position as possible. No preferred orientation can be detected, the grain structure is uniform, and the grains are relatively

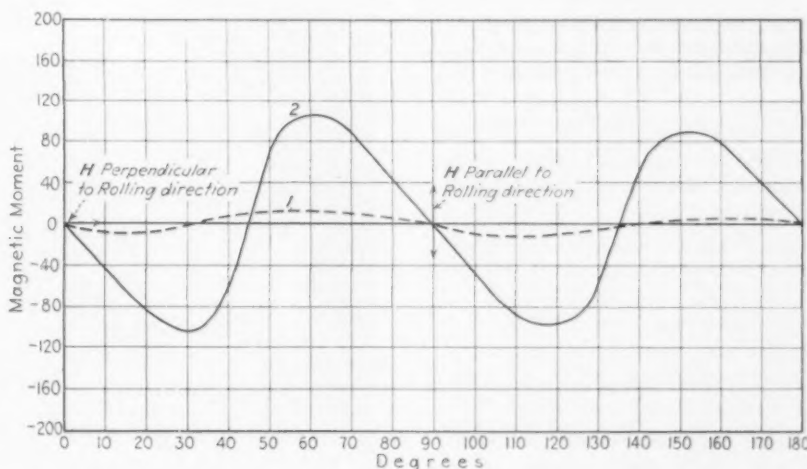


FIG. 4.—These data are a reversal of those in Fig. 3. Curve 1 is the torsion magnetization characteristics of cold-rolled silicon steel. Curve 2 is the same steel annealed. In this case the annealing has increased the magnetic moment.





FIG. 5—X-ray diffraction patterns showing preferred orientation (5a) and grains distributed at random (5b). To the left is a preferred orientation as displayed in a recrystallized grain structure of low carbon steel. To the right is a random distribution in a Goss processed silicon strip. The latter material is characterized by a high magnetic moment.

small (2 mm. or under in size). To obtain this X-ray diffraction pattern the X-ray beam was transmitted to the surface, and it was necessary to expose the film for a period of one week during which time the specimen was moved at regular intervals, as already stated. Over 100 specimens have been studied in this way and none has ever shown any evidence of preferred orientation.

To explain the high magnetic moment or single crystal properties found in this silicon steel, a very marked preferred structure similar to the one shown in 5 (b) would be necessary. Since a random structure is found, the high magnetic moment cannot be explained on the basis of preferred orientation.

TABLE I

These English Tests Compare the Magnetic Characteristics of Goss Processed Silicon Steel and Regular Commercial Steel

B (Kilo Lines Sq. Cm.)	Values of Magnetizing Force H (c.g.s.) for:			
	Goss Silicon Steel		Typical Commer- cial Specimen	
	Along Grain	Across Grain	Along Grain	Across Grain
5	...	1.15	0.55	0.8
8	0.45	2.3	0.85	1.35
10	0.65	3.75	1.3	2.05
12	1.1	6.6	2.25	4.25
13	1.5	10.0	3.9	8.0
14	2.25	18.0	11.0	19.5
15	3.75	38.0	30.0	48.0
16	8.0	72.0	62.0	88.0
17	20.0	120.0	111.0	135.0
18	50.0	190.0	188.0	205.0
19	125.0	300.0	335.0	345.0
20	630.0	510.0	900.0	900.0

TABLE II

Comparative Tests Showing the Low Watt Loss of the New Silicon Steel in a Direction Along the Grain

Density	Fre- quency	New Silicon Steel, Watts per Kg.		Best Com- mercial Steel
		Along Grain	Across Grain	
5,000	50	0.24	0.42	...
8,000	50	0.57	0.98	...
10,000	50	0.88	1.55	1.06
12,000	50	1.27	2.70	...
13,000	50	1.52	4.3	1.76

eration is eliminated. By using this unique furnace the material is given a completely uniform heat treatment.

The material is then given a predetermined amount of cold reduction in the Steckel-type cold mill, described in THE IRON AGE of Jan. 4, 1932. The reductions vary from 50 to 80 per cent.

From the cold mill, the strip goes again to the electric furnace for an intermediate heat treatment, the temperature of this anneal being determined from laboratory tests on the samples. It is then cold rolled to the final gage

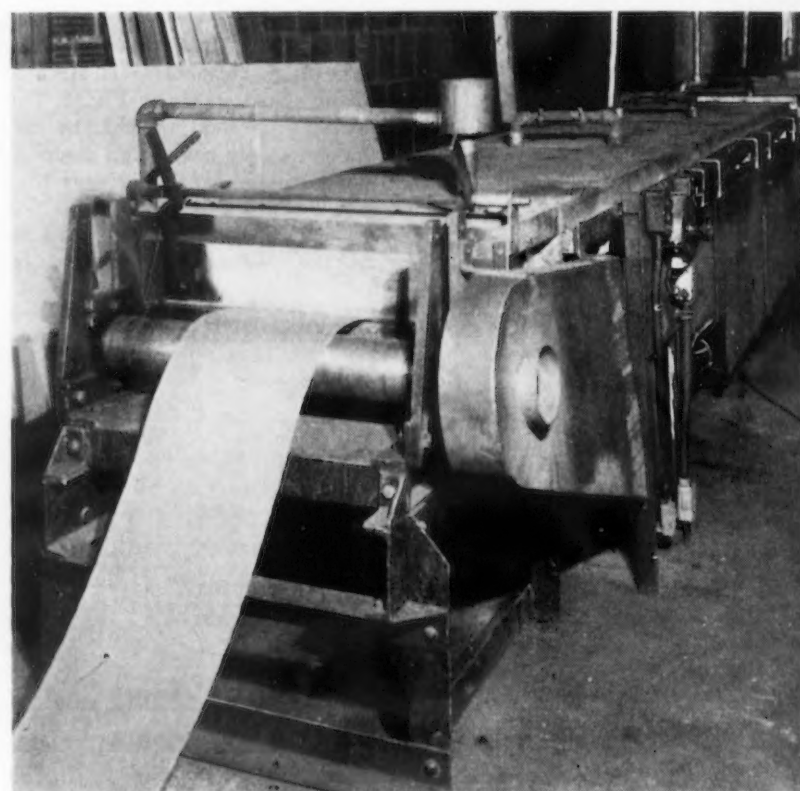


FIG. 6.—This electric roller hearth heat treating furnace was especially designed to handle silicon steel strip continuously. A reducing atmosphere is maintained throughout the furnace.

TABLE III

Total Transformer Sheet Steel Consumption in the United States

Year	Power	Distribution	Total (Net Tons)
	Trans- formers	Trans- formers	
1928	9,950	18,750	28,700
1929	15,700	23,400	39,100
1930	11,500	19,300	30,800
1931	7,600	11,000	18,600
1932	1,150	4,650	5,800
1933	1,150	4,100	5,250
1934	2,900	5,800	8,700
1935	4,350	8,700	13,050
Total	54,300	95,700	150,000
Average	6,787	11,963	18,750

and again heat treated at a temperature close to 2000 deg. F. for a 3 per cent silicon steel; close to 1600 deg. F. for a 1 per cent steel. The time and temperature of heat treatment is of major importance. To illustrate, a coil heat treated at 16 ft. per min. gave a watt loss of 0.45; when the speed is decreased to 8 ft. per min. the watt loss jumped to 0.65 watts per pound in the same coil.

In making this steel it is not unusual to hold the finished product to within 0.0005 in. of the exact thickness desired. When stacking pieces blanked from strip produced by this process, a space factor in excess of 96 per cent is usually obtained.

To show the high permeability of this steel in low magnetization fields, consider Fig. 7. The small strip is supporting the large by the magnetic force induced by the earth's field. This same experiment is possible with Permalloy, but note that this silicon steel is equally as efficient. For the upper strip is smaller than the lower, and the area of contact is comparatively small.

The new steel also has a high permeability at high magnetization values, as demonstrated in Table 1. The data shown there was assembled by a well known English steel laboratory; they show the relationship between the various exciting forces  $H$  and the induction  $B$  which results. A peculiar phenomenon is that at flux densities of about 18,000 lines per sq. cm., the cross grain properties are superior to the grain properties, especially with regards to permeability. Table II gives watt losses for various inductions at 50 cycles. Note the superiority of this new steel in



FIG. 7—Demonstrating the high permeability of Goss processed silicon strip. The small upper strip supports the lower due to the magnetic force induced by the earth's field. As the upper strip is rotated at right angles to the earth's field, the lower strip drops off.

the direction of the grain, as compared with a typical commercial steel.

The most conspicuous merit of the watt loss is its desirable proportionality relative to its component parts—hysteresis and eddy current losses. Several well known authorities on magnetic properties have stated that a desirable separation for transformer design would be  $W/h = 50$  per cent and  $W/e = 50$  per cent. Of course this was from a reference point of  $B = 10000$  gauss and at a frequency of 60 cycles. This ratio of 1 to 1 for  $W/h$  and  $W/e$  has been difficult to approximate with the high-silicon steel which is on the market today. Probably the nearest approach has been a combination of  $W/h = 65$  per cent and  $W/e = 35$  per cent. When analyzing the total losses of the Goss processed

cold-rolled silicon steel, any number of tests have shown the component parts to be  $W/h = 55$  per cent and  $W/e = 45$  per cent. Such a proportionality, however, would be expected because of the higher permeability which would reduce the hysteresis component of the new silicon steel.

### Large Market Available

The value of high permeability in this new product cannot be over-emphasized in the light of present-day design and use of electrical equipment. By the use of this new steel, radical departure from present transformer and motor design is foreseen by some makers. Specifically in the manufacture of transformers the use of the new steel will often permit of much less iron in the core. Correspondingly less copper will be required and adequate heat dissipation will not be so difficult. The use of the new steel should permit considerably greater overloading without excessive power consumption because of its high permeability at high inductions.

There is a large market available for this type of steel, as demonstrated by the figures in Table III. The total tonnage of sheets used in one year for making transformers alone is about one-half the tonnage of ordinary sheets used by furniture and stove makers.

Several large manufacturers have built experimental transformers using Goss silicon steel. This was done to ascertain what agreement would be noted with reference to laboratory tests and tests of the assembled transformers. Two groups of transformers were built identically with respect to design and losses, except that the core material of one was of silicon steel rolled in the usual manner, and the other was made of this new silicon steel. The unusual feature of these comparative transformers was the low exciting current of the group of transformers built with the new type of material. At the present time additional transformer tests are being made that should be much more interesting than the above mentioned tests, with respect to losses and exciting current. This follows from the fact that the watt losses of the strip have been greatly reduced since the first group of transformers was tested.

# Spiral Wire Fabric Conveyor Belts Developed for Special Application

WITH the demand for increased efficiency in the handling of both raw and finished products industry has turned to the more extensive use of continuous conveyors. Belting used for conveyors was formerly chiefly rubber or canvas or a combination of these materials, but occasionally a belt was made of chains and cross slats, either of wood or iron.

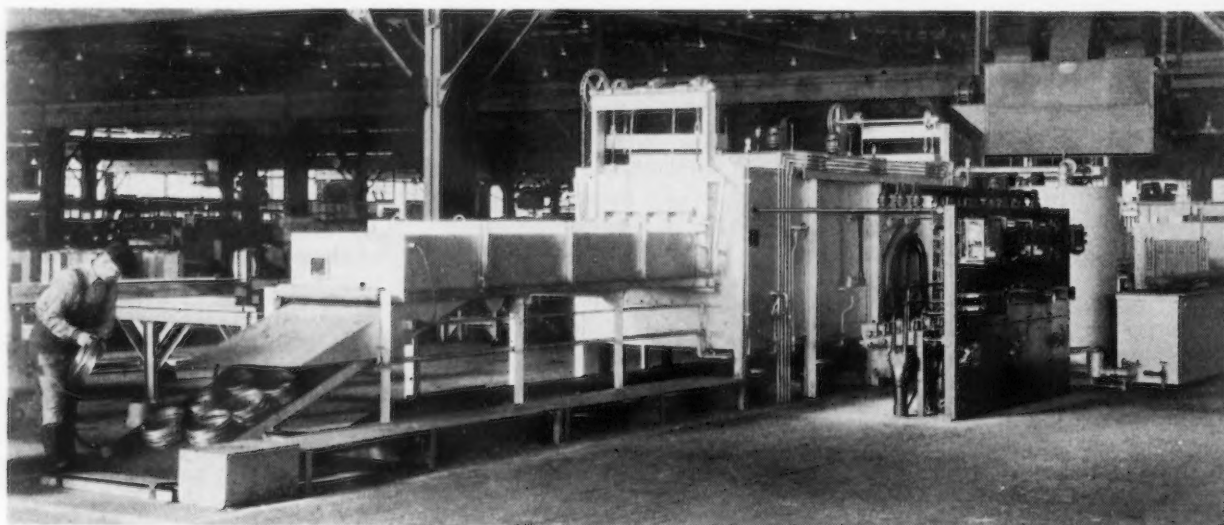
For conveyors operating at high

temperatures, in moist or corrosive atmospheres, in drying ovens where free circulation of air is necessary or in washing machines where the unimpeded flow of the washing fluid is essential, canvas or woven belting is not usually satisfactory. To meet these particular conditions, the so-called spiral fabric conveyor belt came into use, although not extensively until about five years ago.

By means of improved methods

of manufacture, new designs and the use of new corrosion resisting materials, The Wickwire Spencer Steel Co., New York, has greatly broadened the field of usefulness of this type of construction.

Conventional spiral fabric is made of wire and consists of a series of flattened helical spirals interlocking with each other to make a fabric of high tensile strength and maximum flexibility. The mesh, or openings in the belt,



THE charging end of a continuous furnace for bright annealing copper tubing, which handles coils up to 30 in. in diameter by 10 in. in height, and also straight lengths up to 35 ft. in length. The material is carried into and through the heating and cooling chambers of the furnace on a Wickwire Spencer continuous mesh belt conveyor and is discharged bright, clean, dry and ready for shipment. The furnace is 97 ft. long.



depends on the pitch of the helix and its diameter and may be as small as 14 to the inch, using wire 0.018 in. diameter, or as large as 2 in. with wire 0.192 in diameter.

Spiral fabric in itself does not make a good conveyor. This is due to the fact that when the spirals are all wound in the same direction and used as a belt it travels sidewise on the pulleys—to

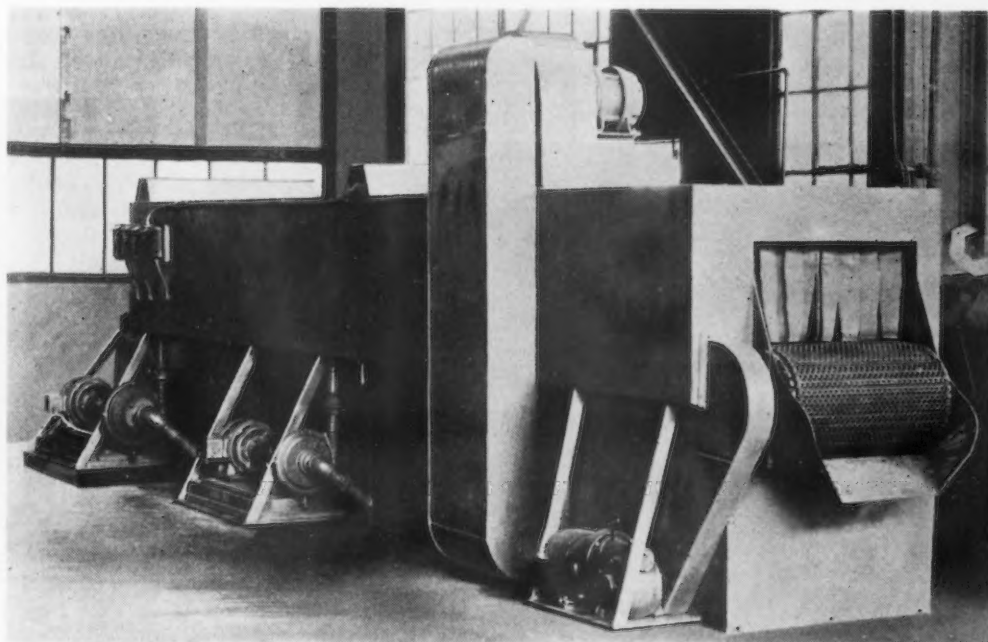
since the side travel is less on a large pulley than on a small one. A belt might be made in two sections only, but with such construction it is evident that the side travel would be much greater than in a belt of short sections.

#### Rods Between Adjacent Spirals

A recent development has been perfected and patented in the form

for such installations. In belts made up of sections there is an inherent tendency for the fabric to warp alternately up and down where the sections are joined together, resulting in a wavy edge. To overcome this difficulty and produce a perfectly flat belt and, at the same time, one that may be used on small pulleys, the balanced spiral fabric has been developed

**W**ASHING machines are an important outlet for continuous spiral mesh conveyors. This machine is built by N. Ranschoff, Inc., Cincinnati, for the Apex Electric Mfg. Co., Cleveland, and is equipped with a Wickwire Spencer conveyor belt 46 ft. 6 in. long and 26 in. wide, three quarters mesh, No. 10 wire conventional spiral construction, right and left every 12 in., with patented safety selvage edge of plain steel. The machine is used for washing, rinsing and drying stampings, forgings and miscellaneous machine parts.



the right if the spirals are wound clockwise and to the left when they are wound counter-clockwise.

Much effort has been expended to develop a method of preventing this side movement in conventional spiral fabric conveyors. The force causing the side movement is the wedging action between the spirals as they engage with the end pulleys. On wide belts running over small pulleys this force is very great, and, if resisted by flanges on the pulleys, or by guides, the fabric is seriously distorted.

It has been found good practice to permit these belts to travel sidewise and compensate for this movement by making the belt in short sections of fabric, woven alternately, right- and left-hand direction. Since these sections are all of the same length, when one section has side traveled, the following section compensates a like amount. A common practice is to make such sections of a length equal to the diameter of the pulley,

of a straight rod, inserted between two adjacent spirals. This separates the spirals sufficiently to eliminate the side wedging action when the pulleys are of reasonable diameter. With this arrangement a belt may be made of all one hand weave and still have no tendency to travel.

This inserted rod also acts as an internal truss to prevent contraction in width on heavily loaded belts. The advantage is apparent in belts operating at high temperatures when the tensile strength and yield point of the wire are greatly reduced by the elevated temperature. With this construction belts fabricated of proper heat resisting alloys may be made to perform satisfactorily at temperatures as high as 2100 deg. F.

Where it is necessary to use small pulleys this inserted reinforcing rod is insufficient to prevent the belt from traveling sidewise and it has been necessary to depend on alternate woven fabric

and patented by the Wickwire Spencer company.

#### Spirals Hinged Together

This construction is a combination of the reinforcing rod and the alternate weave and consists of single spirals hinged together by a crimped connecting rod, these spirals being arranged alternately, right and left hand pitch. The connecting rod reinforces the fabric against contraction in width, but still leaves it perfectly flexible.

The principle of the alternate spirals is the same as for the alternate sections, but it is obvious that the side travel of one spiral to compensate for the other is infinitely smaller than would be the case with a long section composed of a large number of spirals. Without the crimps or convolutions in the connecting rods, the spirals would slide sideways. When tension is applied to a belt of this construction the spirals become seated in the convolutions of the

connecting rods and result in a fabric rigid against side distortions, but free to flex over the smallest pulley, straight and flat.

In connection with any of these constructions, it is possible to attach lifts or cross bars at regular intervals to prevent the product being conveyed sliding on the belt where it becomes necessary to operate at an angle. The style and type of this lift depend on the kind of material conveyed. In ad-

dition it is possible to furnish a flexible guard edge at right angles to the surface of the belt to prevent articles falling off.

If it is desirable to separate the product being conveyed, this upright edge may be attached in the center of the belt to form a dividing partition. If desirable, several such dividers may be inserted, forming as many separate lanes lengthwise of the belt as needed.

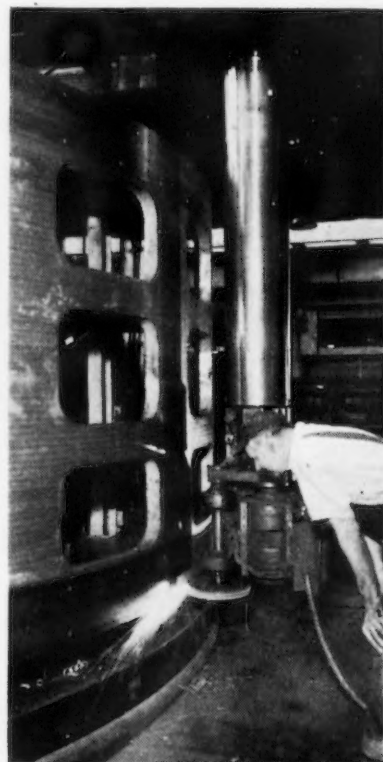
The belts described in this ar-

ticle are of standard types in general use. In addition to these there are special features which may be attached to the fabric for special purposes. On account of the adaptability of this material for so great a variety of purposes it has been found advisable to consider each installation independent of all others and then to recommend the belt best suited to meet all requirements.



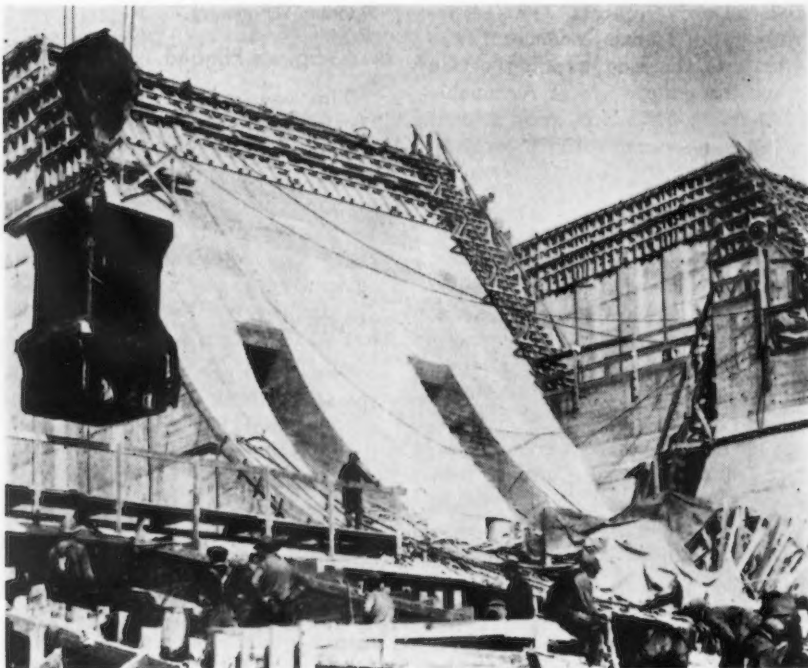
#### AT LEFT

THE girl is holding a new form of traffic beacon which will be used in Birmingham, England. This seamless aluminum globe was spun by the London Aluminum Co., Ltd., of Westwood Road, Witton, Birmingham. The beacon has the standard "traffic yellow" finish, and is practically unbreakable.



#### ABOVE

THE employment of special methods to insure a smooth continuous finish on machine parts has been found effective by the Westinghouse Electric & Mfg. Co. at its East Pittsburgh works. The face of the frame illustrated contains inserts of hard molybdenum steel. To make a finish cut sufficiently smooth with the tool running on and off the hard sections was impracticable. A medium grit Carborundum wheel was, therefore, employed.



#### AT LEFT

THIS hodcarrier carries twelve tons of concrete at a trip at the Norris Dam, near Knoxville, Tenn. Being a T.V.A. project, we are surprised that the hodcarriers' union has made no protest. Think of all the employment that might be created if men had to climb ladders with hods on their backs on this project.

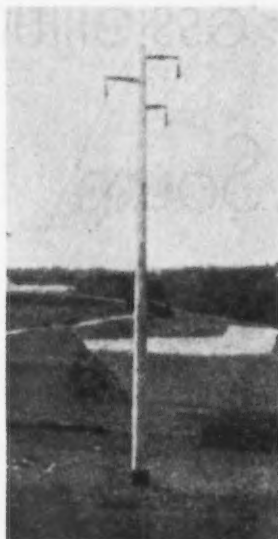
# Europe Uses Sectional Steel Poles

**A** HITHERTO unexploited field for the use of steel sheets has been opened in Europe and promises to be equally successful in this country. This new type of steel pole made of sheet sections totals only one-third or one-quarter of the weight of an equivalent wooden pole, and still less when compared—strength for strength—with a girder or concrete mast. The poles can be used for transmission or telegraph lines. Each section is about 6 ft. long, the cross-section is elliptical, and the size and thickness vary according to the height of pole required and the nature of the conductors to be carried.

The sections are standardized in 12 sizes, and from these standard shapes about 55 different types of pole can be built up. A five-section pole can be put together and raised to the vertical position by two men in about three minutes. Special climbing irons are available so that linemen can readily ascend to attach wires to insulators or carry out repairs. In setting the poles, the major axis of the elliptical section is placed at right angles to the line of the route.

The various sections constituting a pole can be nested for transportation, as demonstrated in the top view. The sections shown on the bicycle can be fitted together to make a 30-ft. pole, and can be erected by one man without the use of tackle. The cross-arms are designed to slip over or clip on firmly to the masthead without weakening any part or forming pockets for condensation and rain water, snow and ice. The butt end section is normally dipped in a hot lead bath or, where conditions of soil necessitate, given a bituminous coating or bandage or protected by a layer of concrete.

A 50-ft. pole with cross-arms and lines attached is shown in the middle view. In the case of overloading or accidental damage, the poles do not collapse, but merely buckle. The kinked section can easily be replaced and the line re-



mains in service, even if some of the poles have been damaged.

In order to retard corrosion, the steel used is usually of the low alloy type with a corrosion resistance superior to ordinary copper bearing steel. The life of these poles is double that of wooden poles, and the original cost is about the same. The sheets are cut in such a way that wastage of material is practically eliminated, after which they are rolled into conical cylinders, which are then fastened to formers and held in position by calibrating rings for twin spot welding. Afterward the cylinders are placed on a seam welding machine, where the overlapped joints are welded by a "roller step-by-step" process. Subsequently the sections are pressed into an oval shape and, after pickling, they are galvanized. Finally the butt end section is hot lead coated or dealt with as already described.

The cost of a complete plant necessary for an initial output of 1000 poles per month is estimated to be about \$6,000. So far the poles have only been made in Germany, but international rights of manufacture outside that country have been acquired by E. Cecil Kny, 19 Palace Street, London, England, and his partner, R. Brehme, of Hollister, Cal. In the Eastern and Middle Western States the rights are to be handled by the General Electric Co. of New York, the Northern American Co. and the Standard Gas & Electricity Corp.

The poles are designed with a safety factor of  $2\frac{1}{2}$ . The lower view shows a 30-ft. pole being bent at the top with a deflection of 2 ft. At this point the pole suffered no ill effects. Tests have been made of a lighter type pole made of steel 0.06 in. thick; this pole withstands a load of 9500 lb. A heavier pole for high-tension lines is 38 ft. long and weighs 488 lb. As tested, the normal load was 1060 lb. and the reaction at the ground line equalled 19,222 lb., which is about  $2\frac{1}{2}$  times the normal working load.





DOWNSTREAM view of the recently completed navigation lock at Wheeler Dam near Muscle Shoals. This lock has a single lift of fifty feet—one of the highest single lift locks in the country. Wheeler Dam is 15½ miles upstream from Wilson Dam.

## Ferro-alloy Possibilities Of the South

By EDWIN C. ECKEL

*Chief Geologist, Tennessee Valley  
Authority*

IN view of the vast amounts of electric power that are and will be developed under various projects now under construction or discussion, it is obvious that careful consideration must be given to determination of the most profitable uses to which this power should be put. My own feeling has always been that a very large part of it will ultimately be devoted to various electro-metallurgical and electro-chemical industries; and with that in view the Division of Geology, TVA, has put together a

steadily increasing amount of data on the mineral raw materials which might conceivably be required in those industries.

In this brief article I am attempting to summarize the Southern situation with regard to native raw material supplies for the different ferro-alloys and related steels. It is a subject which it is not easy to adequately dispose of in a few words, because as will be seen later almost every one of the raw materials concerned requires qualifications and limitations in its

statement. Each of the alloy metals will be taken up in turn, beginning with the most important, but the one which, in current discussion of Southern ferro-alloy possibilities, is most commonly overlooked. That is iron.

There is, of course, an ample, even superabundant, reserve of iron ore in the Southern United States; and most of it can be economically used to produce an iron or steel product of some sort. But right there we encounter the first of the limitations or qualifications

which we must take into account in considering the possible developments of Southern ferro-alloys. That arises from the fact that of the thousands of millions of tons of iron ore in the South, very few millions are low enough in phosphorus to make serviceable ferro-alloys in competition with Northern or foreign ores.

The red ores, which are the backbone of Southern iron and steel, are steadily high in phosphorus, while the brown ores are usually so. The iron scrap of the region reflects this original defect in the ores, so is not available as a good basis or addition for ferro-alloys.

If we eliminate the three iron supplies just mentioned, we have left as low-phosphorus materials a few types; steel scrap, many of the North Carolina magnetite ores, certain carbonate and brown ores mostly in West Tennessee and in Mississippi, and the bulk of the bauxite ores of the region. I am forced to include these last in this list because as later noted they have already been used in the experimental production of ferro-

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WHAT use will or can be made of the vast amounts of electric power which will be made available in the South through T.V.A. and other power development activities? Domestic uses, naturally, can absorb but a fraction of the energy produced, in spite of the present and prospective rush on the part of inhabitants to secure flat irons, refrigerators and other appliances.

Mr. Eckels believes that a major part of the use will be industrial and as such in electro-metallurgical and electro-chemical operations. In this article, he gives us the T.V.A. slant on ferro-alloy possibilities in the South.

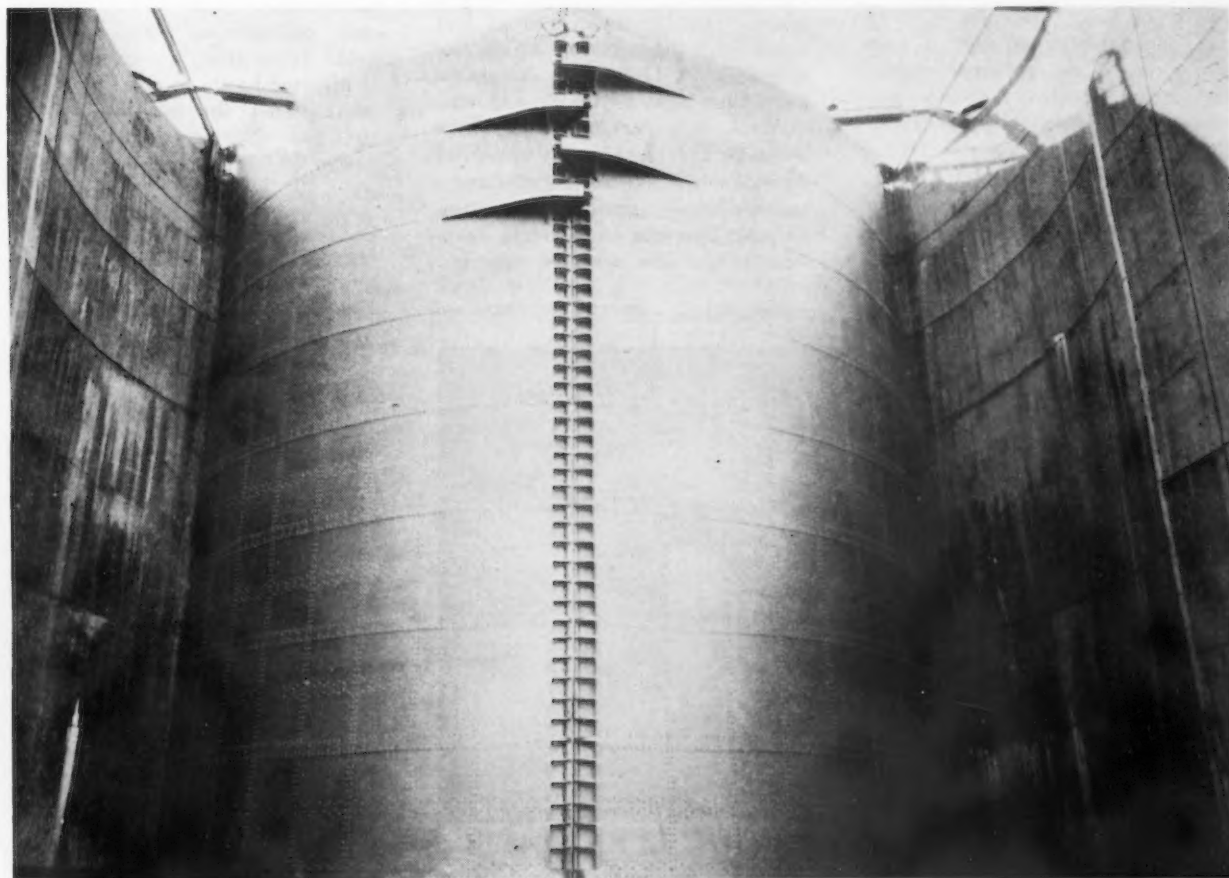
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silicon and high-silicon pig at Muscle Shoals. Out of this rather limited list must be selected the iron component for most ferro-

alloys, and this introduces a limitation not usually brought into the picture. But it is only a limitation after all, and still leaves tonnages enough for any alloy outputs that are likely to be undertaken in the southeastern United States. So we can now turn profitably to consideration of the possible raw material supplies of the non-ferrous components of the alloys.

#### Bauxites Offer High-Silicon Pig Possibilities

This is not mentioned here because of its metal base, but because the more highly ferruginous bauxites furnish one of our few sources of low-phosphorus iron—low-phosphorus as compared with red or brown ores, that is. This fact will have an influence on plant location, because as demonstrated in recent work ferro-silicon and high-silicon pig can be made easily and cheaply as a by-product in alumina cement manufacture, using these bauxites as one of the raw materials. Because of that condition the Sheffield region in northwest Alabama



LOCK gates at the recently completed navigation lock at the Wheeler Dam near Muscle Shoals.

appears as a possible location for this particular ferro-alloy industry.

#### Low-Grade Chrome Ores

There are very few serious chromite deposits in the South, but there appear to be considerable tonnages of very low-grade chrome ores in which the gangue mineral is olivine. Olivine has now a growing commercial and industrial value, and since mechanical separation of chromite and olivine is very easy on a gravity basis, it seems possible enough that we have in all sufficient tonnages to make a very respectable output of ferro-chrome or related alloys in the South. These chromite deposits, it may be noted, are all in western North Carolina and Georgia, so that they fit in well with utilization of the magnetic ores as the iron component.

#### Manganese Presents Difficult Problem

When we reach the subject of manganese we reach something that is always a matter of controversy, because though the basic facts are well enough known, it is very difficult to state those facts and their industrial implications fairly in brief statements. Perhaps an attempt at such a summary, based on personal experience over several decades, may clear away some misunderstandings.

Let us accept the fact at the outset that in the Southeastern States, particularly in the Valley of Virginia, east Tennessee and

north Georgia, there are literally hundreds of miles of outcrop of manganese-bearing clays. It would be entirely possible for a competent geologist to say with entire honesty that there are many million tons of manganese ore in the three States above named. But if he wished to complete that statement in equal honesty he would have to add that in all that range there are very few local rich concentrations of high-grade ore. Aside from these few points where the deposits are so localized (and these are mostly in Virginia) the ore outcrop is rather low grade. I might suggest, just as a personal estimate, that if a long stretch of ore outcrop were handled by steam shovel the average grade would probably be between 5 and 10 per cent manganese. All this means obviously that to get any really heavy output there must be selective mining of the richer patches, plus careful concentration. Since that concentration involves not the rather comic log-washers of earlier days but a large and expensive plant, the question immediately arises as to the ore tonnages that are really available within economic reach of such a plant. And here we are at last faced with the difficulty which few attempts at large-scale operation have been able to meet—and survive. It is in fact the point which must be considered most carefully whenever we plan ferro-manganese manufacture anywhere in Tennessee, Alabama or Georgia from local ores. The problem may not

be insoluble, but it is clearly better to face it before the plant is built rather than afterward. I can only suggest that to my mind the only possible solution seems to be in the direction of ore concentration in at least two stages, the first being carried out at small, cheap mills close to the mines, the second at some good rail junction at or near the furnace; the combination might result in adequate tonnages of clean ore.

#### Nickel Possibilities Are Small

Nickel is mentioned here because there have at intervals been reports of workable nickel ores at several points in Virginia and North Carolina. All of these have been investigated by the United States Geological Survey or other competent authority, and in all cases the reports have not been encouraging. There seems today to be no real reason to expect a profitable nickel output in the Southern States.

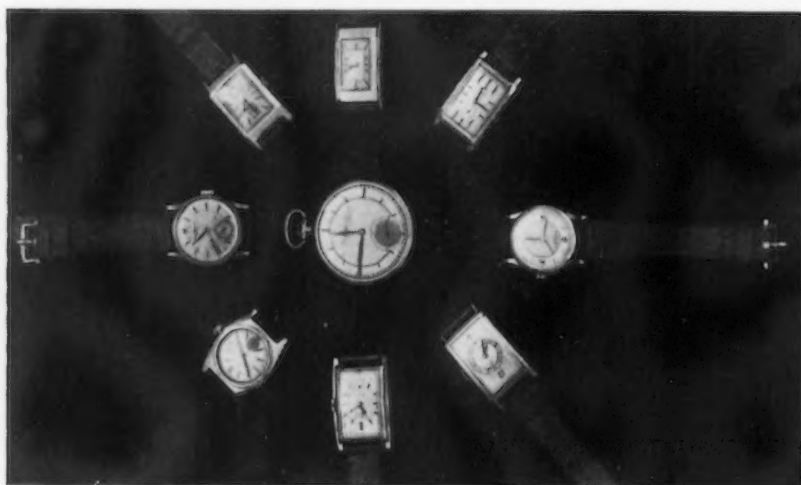
#### Ferro-Silicon Production Feasible

There are very extensive deposits both of pure sands and pure quartzites in many parts of the South, so that the production of ferro-silicon from a steel scrap-sand mixture is easily feasible. Aside from that, attention might be directed again to what was said above under the heading, Aluminum, as offering a far cheaper means of making that particular alloy.

#### Titanium

There are two possible sources of titanium in the South. First, there are rutile deposits in Virginia, North Carolina and perhaps Georgia. Second, there are, in North Carolina particularly, large deposits of titaniferous iron ores. Whether either of these possibilities can be successfully developed into an adequate source of ferro-alloys is a matter that requires separate study of each new locality.

In considering all of the subjects above summarized, there is one new factor which must hereafter be taken into the balance, and in some cases this new factor will clearly alter our old ideas as to possibilities. That factor is the new supply of cheap electric power now becoming available at many points in the South. It can not of itself produce a sound industry, but it may easily offer a profitable solution of a hitherto impossible problem.



**S**TAINLESS steel is now rivaling precious metals in the manufacture of watches. Allegheny metal, a product of Allegheny Steel Co., Breckenridge, Pa., is used to encase world famous watch movements. The brilliant finish of the metal is not unlike that of gold, silver or platinum. The metal is particularly desirable because it affords complete freedom from stain, tarnish or discoloration, and its crystalline hard surface assures long life.



# Steel Rule Dies for Folding Paper Boxes

By ROBERT F. SALADE

be taken from the steel rule die-form, without the cutting rules showing serious signs of wear. It is a comparatively easy matter to remove worn-out cutting rules from a form and to replace them with new rules.

## How Cutting and Creasing Dies Are Made

To provide for the making of all styles and shapes of cutting and creasing dies for folding paper boxes, cartons and display containers, steel cutting rule is manufactured by a number of companies in various body thicknesses, heights and tempers. The standard body thicknesses are as follows: 1, 2, 3, 4, 6, 8, 10 and 12 points (type point system). All these rules are made

in two different types of cutting face, namely, center face and angle side face. The four standard tempers are: Extra hard, hard, soft and dead soft. The two most popular heights of all makes of cutting rule are: 0.923 in. and 0.937 in. Other heights, if desired, are made to special order.

The 2-point body thickness of steel cutting rule of the 0.923-in. height is used to the greatest extent in dies for cutting all thicknesses of box-board from 0.008 in. up to and including 0.030 in. The 0.937-in. height of cutting rule is used for dies which are usually intended to cut heavier weights of paper-board. Cutting rule with center face will readily cut nearly all types and weights of box-board, but for precision die-cutting of hard and thick makes of paper-board, steel cutting rule with angle side face may be utilized to the best advantage.

## Steel Creasing Rule

Steel creasing rule (necessary for any cutting and creasing die) is manufactured only in hard temper, in standard height of 0.918 in., and in the body thicknesses as follows: 1, 2, 3, 4, 6, 8, 10 and 12 points, all these with center face only. It is an interesting fact that various thin weights of folding box-board are cut and creased with dies set up with the 0.923-in. height of steel cutting rule and with the

(CONTINUED ON PAGE 84)

CONSIDERABLE quantities of steel in various thicknesses and tempers of steel cutting and creasing "rules" are formed into cutting and creasing dies, annually, for the making of paper boxes. Little has been published as to the technique of the making of such dies, which, as the author explains, is a comparatively simple matter.

STEEL rule cutting and creasing dies are used in the manufacture of all styles, shapes and sizes of folding paper boxes, cartons and display containers. The sheets of box-board are first printed or lithographed with the desired number of duplicate designs for the predetermined shapes and sizes of folding boxes. The multiple form of cutting and creasing dies is set up in complete units, to correspond with the printed specifications on the sheets. The die-form is then locked up and placed on a flat-bed cutting and creasing press. The printed sheets are then run through this press, to have the printed units cut and creased to the required shapes.

For long runs of folding boxes, according to their all-over size and cut-out shape, as many as 200 complete duplicate designs are printed at one operation on large sheets. In like manner, the same number of printed units are cut and creased as each large sheet is fed through the cutting and creasing press. Many thousands of impressions can



# Improvements in Production

## New Stationary Keyway Cutter And Slotting Machine

A NEW keyway cutter and slotting machine in the use of which the work remains stationary is announced by the Morton Mfg. Co., Muskegon Heights, Mich. The machine is shown below. It consists primarily of four units; the top plate, the guide and cross-head unit, the column and the driving unit.

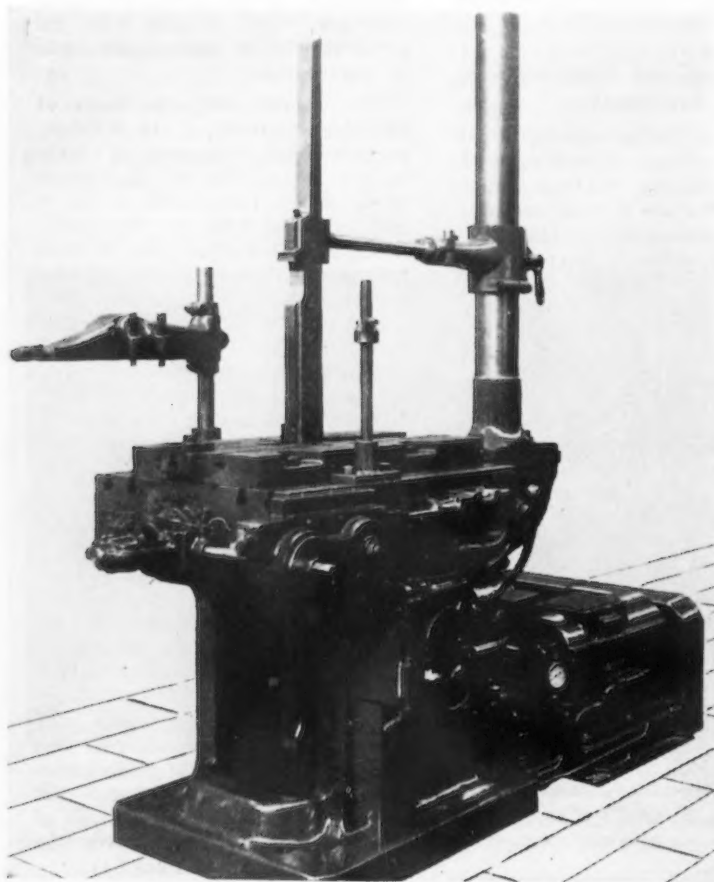
The top plate is rectangular in shape with a large surface. It is T-slotted on the top surface, and is heavily ribbed and cross-ribbed. The lower side is a machined and fitted bearing surface and bolts rigidly to the supporting column. An auxiliary top plate is used be-

tween the main top plate and the work, as a protection in the handling of heavy work. The auxiliary top plate contains jaws for centering all diameters of bores with a minimum amount of equipment.

A bracket which contains a rotating nut and screw mechanism for feed and relief is bolted to the front of the top plate. A locking collar graduated in thousandths provides a means for setting to total depth of cut. Ratchet feed mechanism with feeds ranging from 0.001 to 0.020 of stroke is also attached to the top plate and is so arranged that when the cutter reaches the predetermined

depth a friction slips, limiting the depth and making practical duplication of depths without resetting.

The guide contains all the gearing for transmitting power to the spiral-cut pinion and rack which reciprocates the cross-head and the cutter bars. The guide is journaled in a special trunnion member which has a very carefully fitted bearing surface moving in line parallel with the top surface of the top plate. A positive means is provided for locking the guide with the trunnion member; the guide, cross-head and bar may thus be adjusted to any angular position, up to 1-in. taper per ft., with the top surface of the top plate. The cutter then travels in this same angular setting and feeds and relieves by means of the relative



AT LEFT

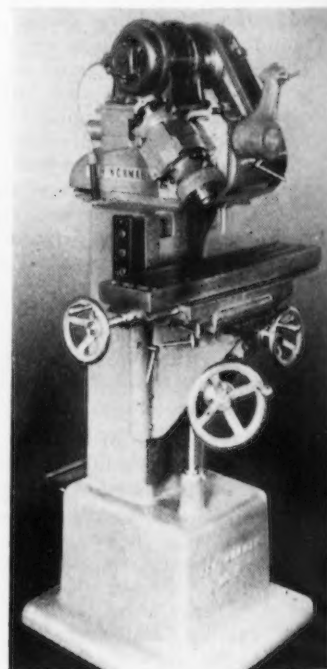
**New Stationary Keyway Cutter and Slotting Machine—**A 30 to 60-in. range of stroke is provided for operations performed with the work held in a stationary position.

*See column 1, above.*

AT RIGHT

**New No. 6 Hand-Feed Toolroom Miller—**The flexibility of this machine, through use of a swiveling head, together with its size, provides convenience in completing pattern shop and experimental work operations.

*See column 3, opposite page.*



# and Shop Equipment . . .



lateral movement between the trunnion and the top plate.

The column is a box shape casting heavily ribbed to support the top plate and heavy loads such as flywheels and propellers. The shifting and stroke-adjusting mechanism is attached to the column and is driven through a universal shaft from the lower extremity of the guide.

The driving unit consists of an oil-containing gear box in which two clutches run in opposite directions. Reciprocation is obtained by means of engaging one or the other of the clutches. This motion is transmitted to the guide by means of a universal joint spline shaft.

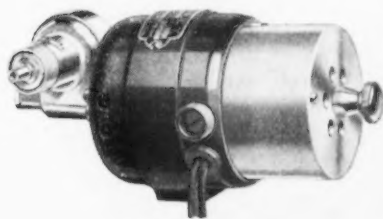
The power to the gear box is supplied by either a constant speed d.c. or a.c. motor, a variable speed d.c. or a multi-speed a.c. motor driving through multiple V-belts. A centralized oiling system is employed for all moving parts.

The cutter bars are made of rectangular section heat-treated steel forgings proportioned for maximum stiffness. Tool slots for inserted type high-speed steel cutters are accurately finished and the pressure surfaces are lined with removable hardened liners.

The machine can be furnished in sizes ranging from 30-in. to 60-in. cutting stroke.

## New No. 6 Hand-Feed Toolroom Miller

A NO. 6 miller, with hand feed only, is announced by the Van Norman Machine Tool Co., Springfield, Mass. The machine is shown on page 36. The cutter head has the swiveling features common to all Van Norman millers, which permits vertical, horizontal and any angle milling. Combined adjustments of the head and ram provide for milling at any angle throughout the full run of the table, using a standard milling cutter. Practically any combination of milling operations can be



ABOVE

**Electric Governors for Fractional Motors**—This unit consists of a 1/25-hp. motor and a 2-in. adjustable governor.

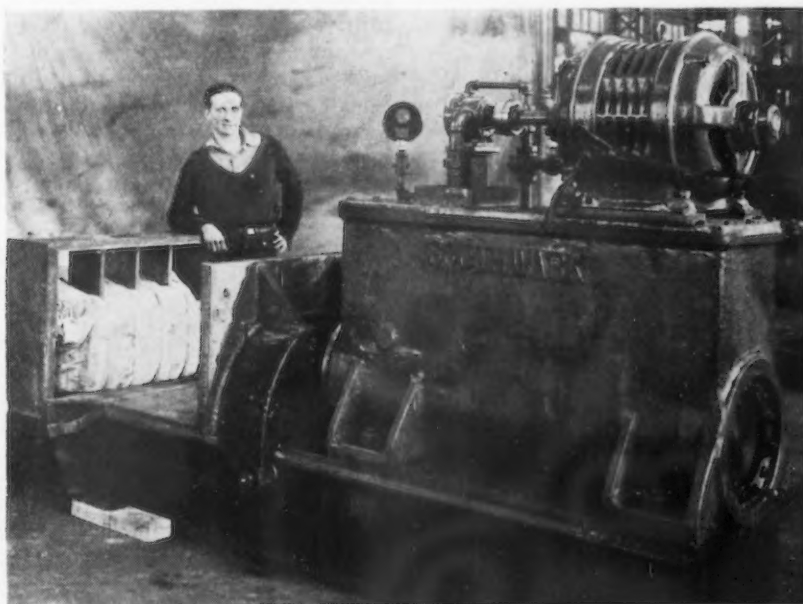
See page 38, column 1.

o o o

BELOW

**Automatic Drill Heads of Unit Type**—These units, designed primarily for the use of small drills, have available speeds up to 8750 r.p.m.

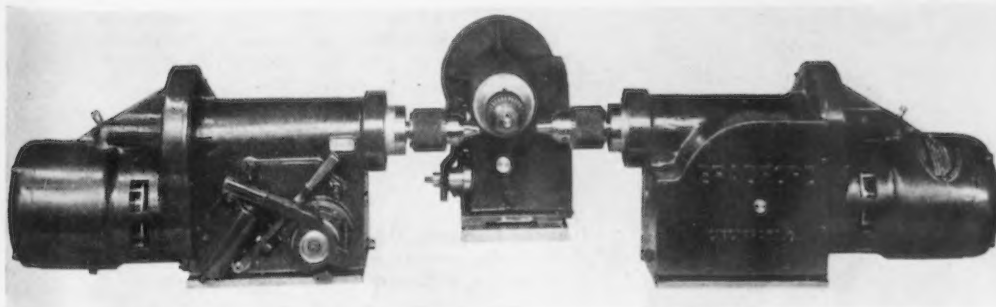
See page 38, column 3.



ABOVE

**Hydraulic Shearing for Baled Rubber**—One ram-stroke completes the multiple cutting of a predetermined number of similar rectangular sections from a bale of rubber.

See page 38, column 2.





completed without disturbing the original work set-up. The machine is designed for a wide range of operations in pattern and experimental shops and in tool rooms. Sliding gears and three-step pulleys, controlled by quick-change shifting levers, provide for nine speeds ranging from 80 to 1450 r.p.m. The knee is heavy box-type and the column, base, saddle and table are rigidly ribbed. Anti-friction bearings are used throughout all units.

## Electric Governors for Fractional Motors

**A**N electric governor, in two types, is now offered by the Dumore Co., Racine, Wis., for use with the company's motors rated 1/64 to 3/8 hp. over a range of approximately 1000 to 7500 r.p.m. An adjustable type, on which the speed can be varied when the motor is in operation is built in three sizes as is also a fixed type which can be adjusted only when the motor is at a standstill. This electric governor control equipment is recommended for talking motion picture projectors, scientific instruments and for apparatus where quick acceleration is required, yet where constant speed under varying load is necessary.

The governor also takes care of fluctuations in line voltage. Pictured on page 37.

## Two-Post Presses for General Purpose Use

**T**WO-POST general purpose presses have been added to the shop equipment offered by the Waterbury Farrel Foundry & Machine Co., Waterbury, Conn. Model No. 44 is shown below. Rigid gate guide above and below the tools and large open tool space feature design provisions. The press is inclinable up to 35 deg., and is built in five sizes with ton capacity ranging from 15 to 50.

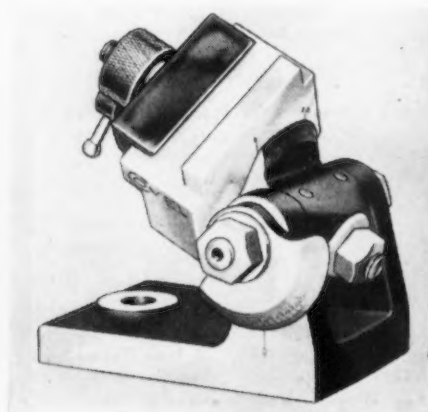
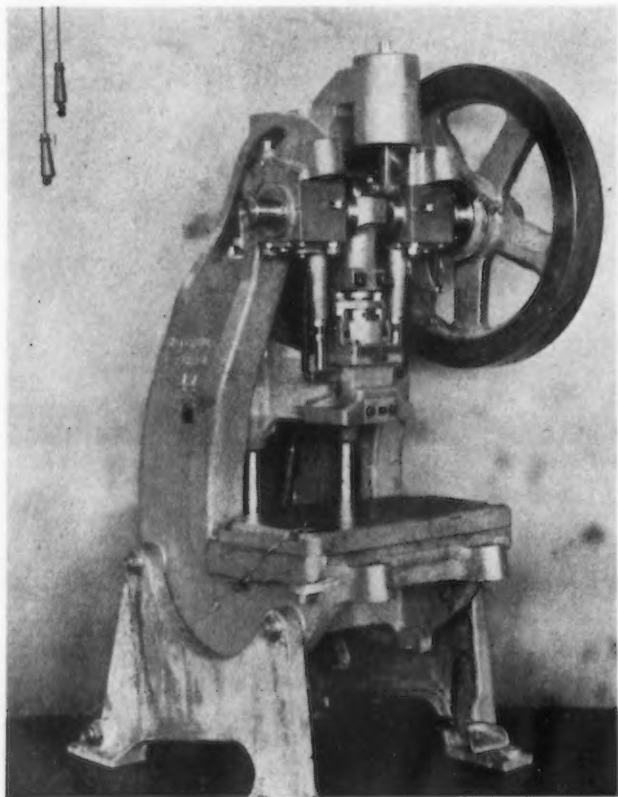
## Hydraulic Shearing for Baled Rubber

**A**SHEAR for cutting bales of rubber of any size into eight or more rectangular prismatic pieces under power supplied by a hydraulic ram is a development of the Baldwin-Southwark Corp., Philadelphia. The machine is pictured on page 37. Its utility covers any kind of rubber, crepe, smoked Latex, sprayed, etc. In bales having any stratification the

cutting tendency is to separate the layers; thus some of the work of the mill is done during the cutting operation. The work table is close to the floor and is unobstructed; this provides convenient working conditions. One cutting stroke only is required. The machine is of high-speed design and its cycle of operation is automatic.

## Automatic Drill Heads Of Unit Type

**T**HE unit automatic drill head illustrated on page 37 has been designed by the Bradford Machine Tool Co., Cincinnati, to provide suitable speed range for small drills. A standard maximum speed of 8750 r.p.m. is provided and the intermediate selections combine with a wide range of feeds to attain desirable operating conditions over the small work tool range of the unit. Bearing support is provided at both front and rear ends of the quill and spindle at all positions of the stroke. Feed variations are by gears through a protective friction clutch which is submerged in oil and adjustable from the outside. Lubrication attention is confined to maintaining a proper oil level through an oil-level opening.



ABOVE

**Universal Vise for Complicated Angles—**Difficult surfaces are conveniently made accessible for grinding, milling and drilling.

See column 2, opposite page.

• • •

AT LEFT

**Two-Post Presses for General Purpose Use—**The elimination of ways, as tool-operating obstructions, is stressed by the makers as a feature of this press.

See column 2, above.

## High-Speed Hand Grinder

A NEW portable electric hand grinder announced by Skil-saw, Inc., 3310 Elston Avenue, Chicago, employs Bakelite exclusively in the construction of the body. Both field and armature windings are baked in Bakelite and varnish. The motor delivers 18,000 r.p.m. and operates on either a.c. or d.c. circuits. The weight of the grinder is 2¼ lb. The equipment is shown below.

## Convertible Motors

STANDARD frequencies for service ranging from 110 to 220 volts are offered in a new line of squirrel-cage, slip-ring induction motors of convertible design announced by the Harnischfeger Corp., Milwaukee. Illustrations below at right. The frame design permits converting from open type to fan cooled, splash proof or fully inclosed construction.

Stator laminations are stacked between heavy steel end rings and the assembly is welded to the frame; this prevents loosening of the stator core.

The rotor windings are assembled from round or rectangular hard-drawn copper bars which are placed in the rotor slots without insulation or slot wedges; the ends are brazed to the end rings by electric arc torch. The range of these

convertible motors is specified—½ hp., 600 r.p.m. to 125 hp., 3600 r.p.m.

## Universal Vise for Complicated Angles

THE universal angle vise pictured on page 38 features the complicated angle grinding of shapes and clearances of tungsten carbide cutting tools as well as general grinding, milling and drilling at any combination of angles. The vise is built in styles A and B, having 1¼-in. and 2½-in. capacity respectively.

The work is held by a fulcrum clamp, and angle adjustments are locked with hardened nuts. Covel Mfg. Co., Benton Harbor, Mich., are the makers.

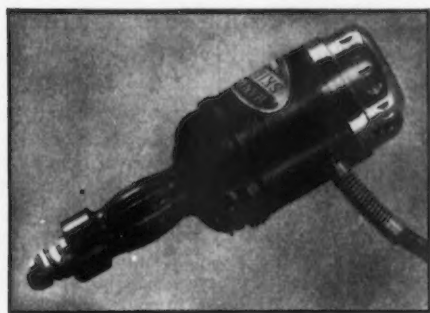
The Hamilton Bridge Co., Hamilton, Ont., in association with Western Bridge Co., will erect a \$350,000 plant at Vancouver, B. C., on the site of the latter's small plant, which will be demolished. Work will be started immediately. The proposed new plant will take care of the western demand for structural steel, etc., and all material will be fabricated there instead of at the Hamilton, Ont., plant as at present. The building will be of steel construction and completely equipped with machinery for fabricating structural steel, machine shop work, etc.

## New Process Lengthens Finish Materials' Life

AMERICAN CHEMICAL PAINT CO. has developed a process in which cleaned steel surfaces are conditioned, or treated for extending the life of the finishing materials without impairing the luster of the applied finishes.

The process is a conditioning rather than a coating process, in that a coating of appreciable thickness is not produced, and there can therefore be no tendency to flake. A crystalline material known as Cromodine is dissolved in water contained in a stainless steel tank, heated with coils to a temperature of 170 to 180 deg. F. In addition to this tank two rinse tanks are required. These can be constructed of steel or wood. The first contains cold water, which overflows freely, and the second contains hot water. The process consists of first removing the oil and rust from the surface. The parts are then immersed into the heated Cromodine solution, in which they remain for a minute. They are next removed and rinsed in a tank of cold running water, and then, by immersing them into a bath of hot water, the drying of the surface is hastened. A powdery residue is left, which in most cases should be removed by a tack rag wipe, after which the surface is ready to receive the prime coat of paint.

This process, it is said, provides an excellent foundation for high bake enamels as well as synthetic materials and oil primers.



ABOVE

High-Speed Hand Grinder—A universal motor powers this portable grinder the body of which is made of Bakelite.

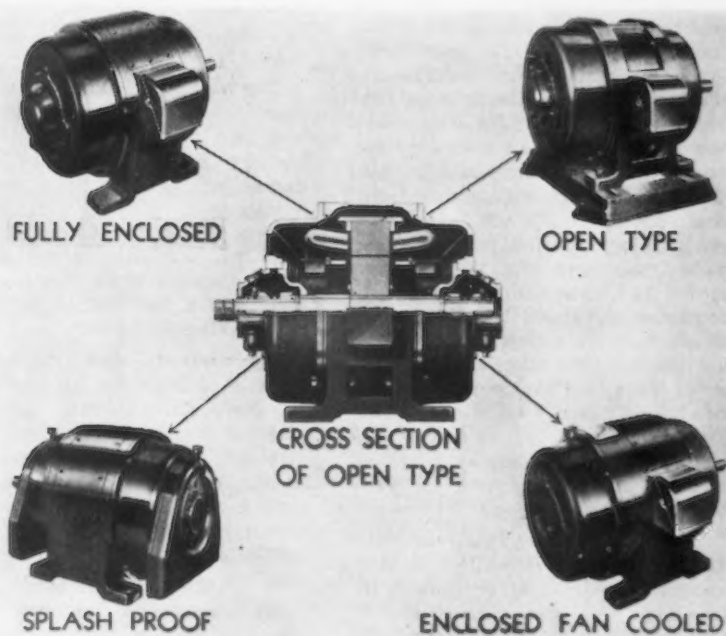
See column 1, above.

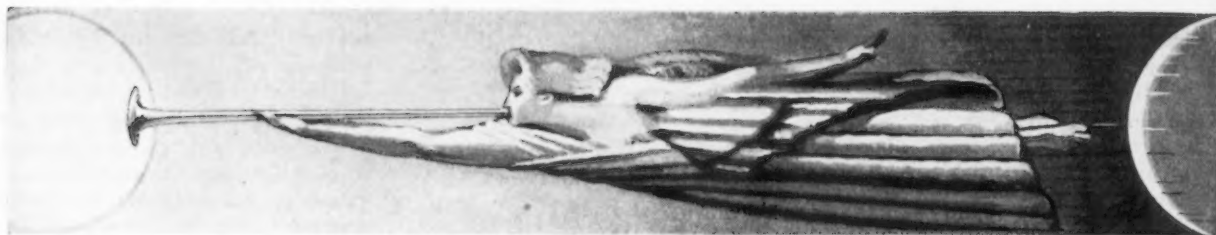
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AT RIGHT

Convertible Motors—The makers stress frame design as a factor of convertibility.

See column 1, above.





## NEWS OF THE WEEK

### GMC Will Produce Diesel Locomotives

THE General Motors Corp., through its subsidiary, the Electro-Motive Corp., will begin construction immediately of a new Diesel locomotive manufacturing plant near Chicago, which will be ready for operation by August. Recent expansion in demand for Diesel-electric locomotives has made it necessary for the Electro-Motive Corp., which for 13 years has built railroad equipment, to sublet portions of the work to plants not affiliated with General Motors. The present expansion plan will concentrate all activities inside the corporation.

The Electro-Motive Corp., organized in 1922, was a pioneer in the development of rail cars powered by automotive equipment, placing in service its first cars in 1924. It became a part of General Motors in 1930 and recently has been operated in conjunction with the Winton Engine Corp., a General Motors subsidiary, at Cleveland. When the new plant is completed, all activities will be removed to Chicago, but Winton will continue to supply the Diesel engines for its locomotives. It is anticipated that the company will make large capital expenditures for new heavy-duty machinery and other equipment for its new plant, but the equipment buying program has not yet gone beyond the preliminary stages.

During the life of this relatively new industry it is estimated that about \$50,000,000 in equipment of this type has been placed in service, of which a large percentage was built or powered by the Elec-

tro-Motive Corp. The Winton Diesel engine is the power plant on the Burlington Zephyr, Union Pacific's M-10001 and the Flying Yankee of the Boston & Maine.

The new plant of the Electro-Motive Corp. will be built by the Austin Co., Cleveland.

### Shipbuilding Case Is Decided Against Union

DECISION was announced on Feb. 14, by the National Labor Relations Board on a complaint, and petition for election, of the Industrial Union of Marine and Shipbuilding Workers of America, on behalf of employees at the Fore River plant of the Bethlehem Shipbuilding Corp., Ltd., Quincy, Mass.

The board decided in its opinion that the union affiliation of three men had nothing to do with their lay-off; that the men were laid off due to lack of work resulting from a stop work order on certain main condensers in the boiler shop, issued by the engineering department, because of a change in design which had to be submitted to Washington.

The board also denied the union's petition for an election at the Fore River plant. After reviewing the evidence as to the strength the union has mustered at the plant, the board has concluded that "an election at this time would in all likelihood merely result in confirming the *status quo*."

An employees representation plan has been in effect at the plant since 1923.

### Profit Sharing Plans Are Analyzed

PROFIT SHARING plans established for the purposes of promoting thrift, extra effort, or a more equitable adjustment of compensation, are the types which show the highest record of success, according to an analysis of profit sharing by the National Industrial Conference Board, New York.

The results of the board's study, contained in a new report entitled "Profit Sharing," show that of the plans established to stimulate thrift, only two out of 21 have been discontinued. The savings feature of these plans provides for cooperative effort by the company and the employees. Regular and sustained savings by the workers are supplemented by payments from the company.

Profit sharing plans created to produce extra effort are, in effect, bonus plans. They prove most successful, according to the board's report, when they are limited to executives and department heads, or, in other words, to those who understand the possibilities of such plans and are in a position to contribute actively to the profit of the enterprise.

Fifteen plans of this type are reported in the board's survey. Only one plan limited to executives was discontinued. Seven of these plans that extended profit sharing to all employees were abandoned. Plans of profit sharing set up to achieve a more equitable basis of compensation have endured. Twelve plans covered in the board's study were established for this purpose and only one has been discontinued.



In plans of this kind the compensation of employees consists of two parts: first, a fixed salary or wage; second, a variable, possible addition to it. The variable portion is the profit share paid periodically—monthly, quarterly or yearly. This amount represents what, in the judgment of the management, is the balance of the equitable share of business income that should be paid as wages.

Profit sharing plans which met with little success had the following purposes: (1) *Stimulation of efficiency.* Twenty-four plans of this nature had been established. Of this number, 14 have been discontinued. The reasons given for their abandonment indicate that profit-sharing as a stimulant to efficiency has not been generally successful; (2) *Improvement of morale.* Of the 48 plans in this group, 26 have been discontinued because of dissatisfaction with their results.

## Europe Buying Stainless Steel Cars and Trains

EUROPEAN railroads are going in for light-weight, stainless steel railroad cars such as those of the Burlington "Zephyr" and the "Flying Yankee" of the Boston & Maine and the Maine Central railroads, which was described in THE IRON AGE last week.

An order for 15 single-unit cars, each to be powered by a Diesel-electric engine, has been placed by the Northern Railways of Italy and another for 30 two-car trains will be placed by the French Railways within a few days, according to Edward G. Budd, president, Edward G. Budd Mfg. Co., Philadelphia, who is in Europe. The cars will be built in Italy and France under licenses from the Budd company, for the use of its shot-weld process of fabricating stainless steel and other patents employed in the building of the American streamlined trains.

The cars for the Italian railroad, which will be used on mountain grades, will be built in the Genoa shop of Piaggio & Co. Representatives of Piaggio spent two months in the Budd plant in Philadelphia studying the construction of Zephyr-type trains, and two Budd engineers will go to Italy to assist in the work there. Stainless steel for the cars has been ordered from the Allegheny Steel Co., Brackenridge, Pa.

## British Iron and Steel Markets Temporarily Dull—Outlook Good

LONDON, ENGLAND, Feb. 18 (By Cable).—The British market is temporarily quiet, partly because of disturbed commodity markets. But the industrial outlook is unimpaired, and a fresh buying movement is expected soon.

Production of Cleveland pig iron has increased in view of higher foundry consumption brought about by large railroad orders. A further shipment of 1000 tons of ferromanganese has been made to Australia. Japan is testing the European pig iron market, having bought all available Russian and Indian supplies.

Semi-finished steel is slow, as consumers are covered and no orders have been placed by the Continent pending a tariff decision. Rolling mills are very busy on orders for railroad, shipbuilding and structural steel. The market for special steels is growing. Exports are broadening.

John Lysaght is installing a four-high, reversing, cold-finishing mill from a design by United Engineering & Foundry Co., Pittsburgh, and a delegation will again visit America with a view toward introducing other improvements to British industry. United Kingdom January exports of pig iron were 11,200 tons, none of which went to the United States. Total exports of iron and steel were 181,000 tons.

Tin plate is generally quiet, but better inquiries are appearing and some export bookings have been made up to May, with home trade further ahead.

The Continental iron and steel markets are persistently dull and output is restricted. Some business with Russia and Argentina is being done but the other markets are lifeless, particularly China and British India.

## Steel Storage Rules Set by Institute

THE directors of the American Iron and Steel Institute, acting as the code authority for the industry, have approved commercial resolution A38 and amended resolution A33, both dealing with the storage and handling of iron and steel products on leased or company-owned property. Both resolutions call for the filing with the code authority of leasing arrangements.

Regulations No. 4 referring to delivery of iron and steel products by rail and ocean or rail, ocean and rail transportation, has also been amended slightly.

## Chicago Engineers To Hold Exhibit

THE Chicago section of the American Society of Mechanical Engineers will hold a meeting and exhibit in the afternoon and evening of March 28 at the Engineering Building, 205 West Wacker Drive, Chicago.

Outstanding papers from men in the machine tool, steel and manufacturing industries have been obtained. E. B. Cole has been appointed chairman of this meeting.

### British Prices, f.o.b. United Kingdom Ports

Per Gross Ton		
Ferromanganese, export .....	\$9	
Billets, open-hearth .....	\$5 10s.	to \$5 15s.
Tin plate, per base box .....	*18s.	2d. to 18s. 9d.
Steel bars, open-hearth .....	\$7 17½s.	
Beams, open-hearth .....	\$7 7½s.	
Channels, open-hearth .....	\$7 12½s.	
Angles, open-hearth .....	\$7 7½s.	
Black sheets, No. 24 gage .....	\$9 5s.	
Galvanized sheets, No. 24 gage .....	\$11 5s.	

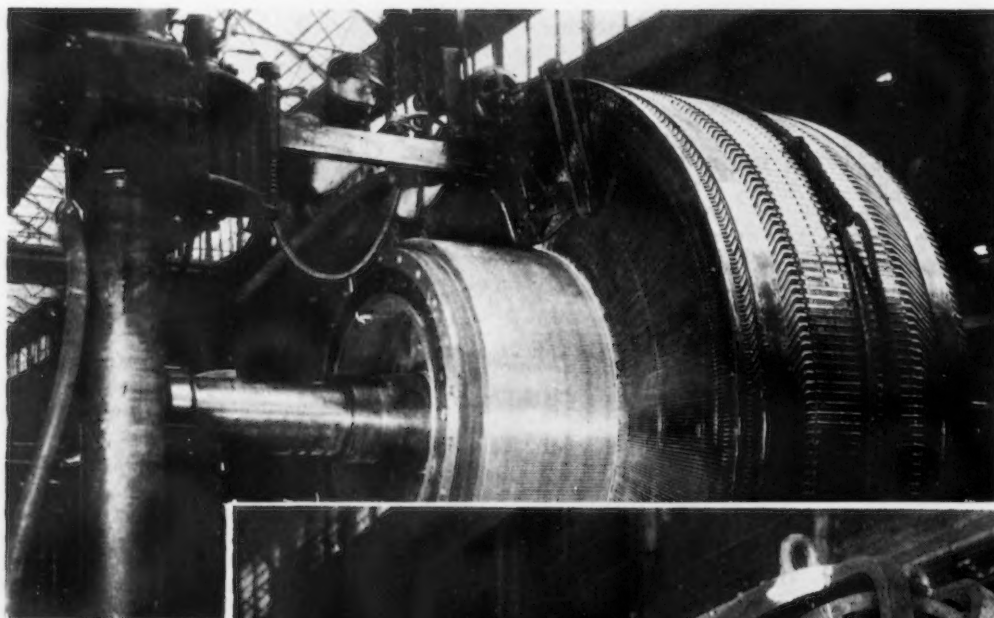
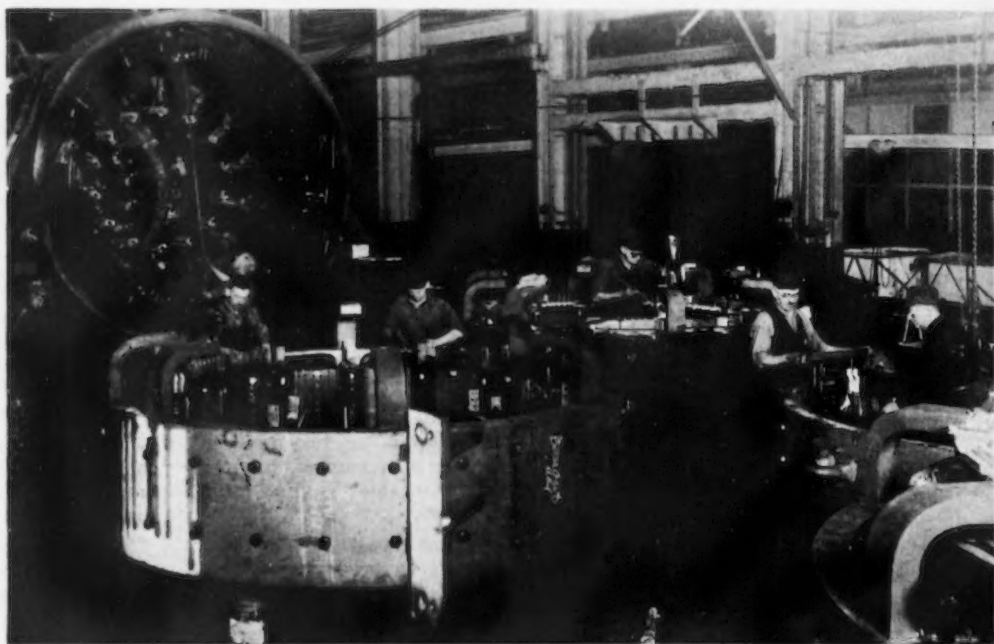
\*To May 1; 18s. 5d. to 19s. thereafter.

### Official Continental Prices, f.o.b. Continental Ports

Per Metric Ton, Gold £		
Current dollar equivalent is ascertained by multiplying gold pound price by 124.14 to obtain franc equivalent and then converting at present rate of dollar-franc exchange		
Billets, Thomas .....	\$2 7s.	
Wire rods, No. 5 B.W.G. ....	\$4 10s.	
Steel bars, merchant .....	\$3 5s.	
Sheet bars .....	\$2 8s.	
Plate, ¼ in. and up .....	\$4	
Plate, 3/16 in. and 5 mm. ....	\$4 2s.	6d.
Sheets, ¼ in. ....	\$4 7s.	6d.
Beams, Thomas .....	\$3 2s.	6d.
Angles (Basic) .....	\$3 2s.	6d.
Hoops and strip base .....	\$4 2s.	6d.
Wire, plain, No. 8 .....	\$5 7s.	6d.
Wire nails .....	\$5 15s.	
Wire, barbed, 4-pt. No. 10 B.W.G. ....	\$8 15s.	

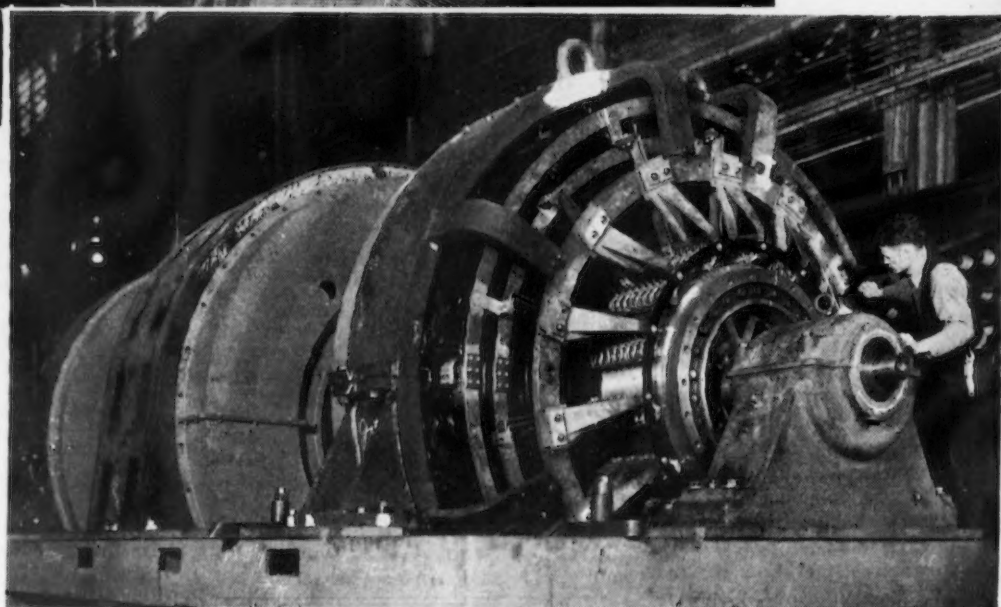
# STRIP MILL ELECTRIFICATION IN THE MAKING

FRAMES illustrated are part of the construction of the motors and other apparatus under construction at the Westinghouse Electric & Mfg. Co., East Pittsburgh plant, which will drive a 79-in. hot strip mill to be installed for the Youngstown Sheet & Tube Co. Six of these 3500 hp. motors are being built for that purpose to drive the finishing stands of the mill. When complete this mill will be the most heavily powered strip mill in operation, having a total of 37,500 hp.



WHEN completed this generator armature will be part of the system supplying power to the 79-in. strip mill for Youngstown Sheet & Tube Co. There are four such generators, each rated 3000 kw., 360 r.p.m., which will comprise two motor generator sets.

TESTING the first of two motor generator sets being built for Youngstown Sheet & Tube Co. by Westinghouse Electric & Mfg. Co. gives a complete analysis of the performance characteristics. When installed this motor generator set will furnish power for the motors driving the finishing stand of a 79-in. hot strip mill.





# PERSONALS

AMBROSE SWASEY was the recipient of the Washington award for 1935 at a dinner given at the Hotel LaSalle, Chicago, on Feb. 20. This award was founded in 1916 by John Watson Alvord "in recognition of devoted, unselfish and preeminent service in advancing human progress." Mr. Swasey received the 1935 award for his distinguished contribution as a builder of instruments, institutions and men.

C. H. HERTY, JR., research metallurgist, Bethlehem Steel Co., Bethlehem, Pa., spoke on "Oxidation of Steel and Effect Upon Finished Product," at the monthly meeting of the Milwaukee chapter, American Society for Metals, at the Milwaukee Athletic Club on Feb. 13.

A. W. LAUDER, formerly president of the Trindl Corp., has been elected vice-president and general manager of the Aurora Metal Co., Aurora, Ill. He was at one time identified with the Lyon Metal Products Co.

ARTHUR J. TUSCANY, executive secretary of the Gray Iron Founders' Society, Inc., Cleveland, has resigned and has established headquarters at 1213 West Third Street, Cleveland, to provide active and advisory service to trade associations and code authorities. Mr. Tuscany first became active in trade association work in 1922, when he assumed the office of secretary-manager of the Ohio Foundries Association. In 1928 he was made manager of the Gray Iron Institute.

LT. KILBOURNE JOHNSTON has been appointed assistant to the Code Administration Director, D. M. NELSON. Lieutenant Johnston is a son of former Administrator Hugh S. Johnson. JOHN W. UPP, Ardmore, Pa., who has served as acting assistant division administrator, succeeds Lieutenant Johnston as acting division administrator for the manufacturing division. Mr. Upp was graduated from Cornell in 1899, and was connected with the General Electric Co. for 32 years.

ATHEL F. DENHAM, for the past eight years Detroit editor for the automotive publications of the Chilton Co., has resigned to form an automotive technical advisory service on advertising and publicity, with headquarters at 1235 Lafayette Building, Detroit.

THEODORE MILLER, 800 North Clark Street, Chicago, has been appointed sales agent to cover Illinois, Indiana, Michigan and Wisconsin for the Marquette Machine Co., Chicago, builder of automatic die sinking machines and duplicators.

R. C. OVERSTREET, formerly identified with the Mueller Furnace Co., Milwaukee, has been appointed purchasing agent of the Young Radiator Co., Racine, Wis. He was at one time purchasing agent of the Nash Motors Co.

L. A. SHEA has been appointed district manager in Illinois and the upper half of Indiana by the

Hevi Duty Electric Co., Milwaukee, with office at 205 West Wacker Drive, Chicago. He will have charge of the company's service and sales agency on electric heat treating furnaces. Mr. Shea was formerly district manager for Ohio.

ROBERT GREGG, vice-president of the United States Steel Corp., has been elected to the board of directors of the American Iron and Steel Institute, New York, to fill the vacancy caused by the resignation of CHARLES L. WOOD, former vice-president of the steel corporation.

W. F. GRADOLPH, who has been associated for the past 24 years with the DeVilbiss Co., Toledo, Ohio, has been elected vice-president in charge of sales.

W. A. NEILL, formerly identified with the Dorr Co., Inc., New York, has been made manager of the mining and construction sales department of the Worthington Pump & Machinery Corp., Harrison, N. J. After his graduation from Leland Stanford University, he was connected for a number of years with the Denver Engineering Works Co., Denver, and later occupied several important posts with the Allis-Chalmers Co., Milwaukee.

GEORGE GORDON CRAWFORD, formerly president of Jones & Laughlin Steel Corp., has resigned as a member of the board of directors of the American Iron and Steel Institute.

FRED D. RANKINS, heretofore Boston district manager for the Fostoria Pressed Steel Corp., Fostoria, Ohio, has been made sales manager of the company's newly created industrial division.

LUDLOW-SAYLOR WIRE Co. of St. Louis, has announced the opening of sales offices in the cities of Philadelphia and Pittsburgh.

Robert J. Cargo of Pittsburgh has been placed in charge of the Pittsburgh office. Mr. Cargo is well known throughout the metal-working industry in the Pittsburgh area. He was for many years associated with The John Eichleay Jr., Co.

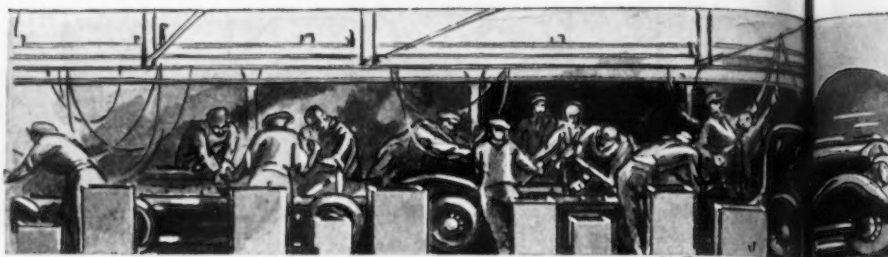
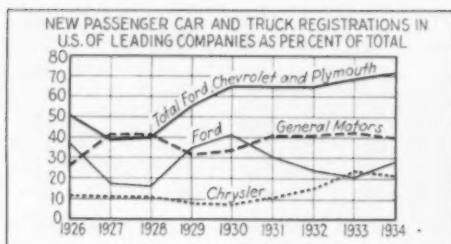
William F. Boore has been placed in charge of the Philadelphia office. He was for many years with the Pittsburgh Steel Co. in various capacities.

These gentlemen have charge of sales of all Ludlow-Saylor wire cloth and woven wire screen products in their respective territories.



M. E. JOHNSON (at left), new manager of export sales of the Pittsburgh Steel Co., DAVID F. MANN (center), district sales manager at New York, and EDWIN V. RECKLEY, district sales manager of the Chicago office. Their promotions were mentioned in these columns in the issue of Feb. 7.





## THIS WEEK ON THE

# Motor Car Operations at High Point; A. F. of L. Plans Automotive Campaign

DETROIT, Feb. 19.

THOSE who are tired of looking at idle factories and at communities still suffering from the full forces of the depression should devise some means of rubbing Aladdin's magic lamp and being whisked to this city and deposited in the midst of the present automotive scene. It is a heartening sight for anyone—trucks and tractor-trailers by the scores trundling parts and materials into motor car plants at all hours of the day and night, the confusion and excitement at the factory gates as shifts change, the increased number of cars on the streets, the crowds of shoppers in retail stores. This scene may be shifted before long, but while it lasts everyone is making the most of it.

Yet in the midst of this bustle strongly remindful of the best days of the twenties, depression fears cannot be entirely downed. While the industry keeps tossing record sales and production figures at this spectre in an effort to knock it down, it bobs up again with regularity and asks the question, "How long can this last?" The answer can't be given with finality, because no one positively knows. But unless all the industry's barometers fail and past performance no longer can be relied upon as a guide, the present pace of car assemblies should continue through the first half of the year.

Steel salesmen are routed out of bed on Sunday night by automotive purchasing agents frantically seeking rush deliveries of certain steel items. Representatives of machine tool companies have to wait until 6 o'clock Sunday morning to

get at equipment to replace parts, because plants are running six days a week 24 hr. a day. Those are two incidents showing the extraordinary happenings in the automotive world these days. So long as dealers keep bombarding factories by mail, telegraph and telephone seeking cars to deliver to customers, this unusual condition will persist.

### Present Rate to Continue

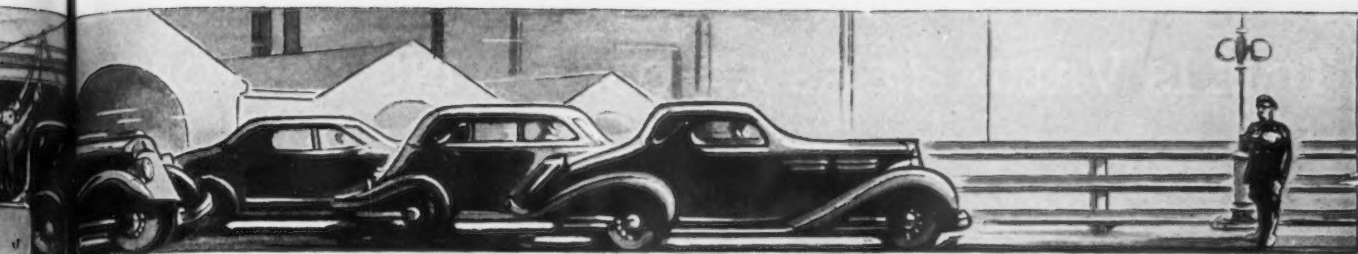
There will be ups and downs of individual companies, as always, but because a particular company finds it necessary or desirable to decrease its operations doesn't mean that the bottom has suddenly dropped out of the automotive market. Where one curtails, another expands, and it is a safe bet that this will be true for the next three months. The industry just now is bowling along at better than a four-million-a-year gait and observers point out that this can't continue, because purchasing power hasn't revived enough to support such operations. Of course not! No sensible person expects present output to be sustained 52 weeks out of the year. The automobile business is seasonal and probably always will remain so, unless buying habits of the people miraculously change. It is not too much of a strain on credulity, therefore, to anticipate that this year, as in other years, from 60 to 65 per cent of the year's assemblies will come off the lines in the first six months. In order to do that and attain even the figures set by the most pessimistic for the entire year, the current pace won't slacken much before June. The usual easing off will occur in the last half, although

the letdown should be less than in other years because of fall introduction of 1936 models.

There no longer are large black blotches on the sales map of car manufacturers. For two or three years the Mississippi Valley and the South represented almost a total loss for many companies, but today these far-flung agricultural districts are among the most productive of new car sales. The reasons are that prices of farm products are up and that cash from the Federal Government is being spent. Having observed what happened to money already distributed by governmental agencies, automotive executives are confident that car sales will benefit both directly and indirectly from the Administration's proposed work relief program calling for expenditures of \$4,880,000,000.

### Steel Users Postpone Orders

Uneasiness is apparent on the part of some steel mills because of the tendency of certain motor car companies and parts makers to hold off placing further orders ahead, whereas a few weeks ago they weren't satisfied unless they could get everything that mills possibly could deliver to them. The explanation may be tied in with several factors—threatened strikes by the A. F. of L., lack of incentive to buy ahead since steel prices will remain at substantially the present levels during the second quarter, and the policy of "staying close to shore" which has prevailed in late years. This development, at any rate, probably has been blown up beyond its importance as a true indication of what lies ahead in the next month or two.



# ASSEMBLY LINE

Car manufacturers are hoping that the present wave of new car buying will not glut used car lots with excessive stocks. The situation is pretty well in hand at the moment, but if retail sales continue at the current volume (as they are almost sure to do), used cars may become a problem. The most encouraging possibility lies in the fact that many cars being traded in for new ones, particularly in rural districts, have been used so long that they are on the verge of disintegration and the only thing to do with them is to junk them. This year, therefore, is likely to bring a sharp increase in the number of old cars scrapped.

Hudson is not taking steel in the quantity anticipated and its operations are reported to have slackened. Buick likewise is said to be running at a slightly lower rate. Hupmobile is doing little. Its sales are understood to have suffered because of the lack of a consistent policy due largely to three changes in management in the last five months. Studebaker will celebrate the latter part of March the lifting of its receivership, the first time in the history of the automobile industry that a company has staged a financial comeback after the courts stepped in. So far as Willys-Overland is concerned, it is believed that David Wilson will continue to exercise the highest powers along with John N. Willys, who has become president. Toledo interests feel that this company stands a good fighting chance of recuperating from its financial illness.

## Ford Still in Lead

In the production race, Ford is still out in front by a wide margin. It should be able to attain its goal of 130,000 cars this month and will enter March with a good chance of getting its projected 180,000 units. Unfilled orders from dealers are said to number 200,000 units, despite the large volume of cars built since Jan. 1. Olds, with 15,000

BY BURNHAM FINNEY

*Detroit Editor, The Iron Age*

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cars set up for February, claims this will be the best month in its history. It recently has been without floor models for its main showroom in the General Motors Building in this city, an indication that retail demand has been in excess of output. Chevrolet is gradually speeding up its assemblies, hoping to make 80,000 units this month. Delays in securing bodies are reported to be interfering with production of at least two General Motors divisions.

Lincoln has bought a few new tools and has ordered some equipment rebuilt for its proposed light twelve. It hopes to widen the market for its products when its new car is announced in the spring and thereby put to use a great part of its local plant which long has been idle. Buick and Cadillac have completed their equipment buying programs. Nothing big is in sight in the way of machine tool purchases in the automotive field in the immediate future. Some companies are devoting attention to ways and means of paring production costs, but how much money they may spend is a guess at best. Most car makers are operating on extremely narrow profit margins this year and are alert to cost-saving possibilities. One company, for instance, must make and sell 90,000 cars this year to break even. It has set its goal at 150,000 units, which is about twice its 1934 record.

## A. F. of L. Has Elaborate Program

The American Federation of Labor has started rehearsals at Cleveland of the strike drama which it hopes to put on around March 1. The Fisher Body local of the United Auto Workers Federal Union in that city has presented to the management a so-called

contract to be signed by both parties. The contract specifies a 30-hr. week of five 6-hr. days, a minimum annual wage of \$1,560 for unskilled workers and \$1,820 for skilled workers, reinstatement with full pay for time lost for any employee found unjustly discharged, and arbitration of all disputes which cannot be settled by mutual agreement. The agency for arbitration naturally would not be the Automobile Labor Board.

Since Fisher's Cleveland plant fabricates parts for bodies for almost all General Motors cars, it is looked upon as a strategic point at which to threaten labor trouble. The A. F. of L., in presenting its demands, set no time limit for a reply by the management. The presentation, however, fits into the program for President Green's stump-speaking tour of automotive cities this week and the meeting of the federation's automotive council in Detroit the coming week-end. Setting the stage for Mr. Green's Detroit appearance next Saturday, the federation's executive council has authorized issuance of a new international charter for the United Automobile Workers' Union, giving this relatively new union an equal standing with other international unions.

At the same time the federation has addressed an appeal to three rival labor organizations in the automobile industry—the Mechanics' Educational Society, the Society of Designing Engineers and the Dingmen's Association—to associate themselves with it. It pointed out that "the history of duplicated effort of organization in any industry has been a sad one for the workers." It claims that it now has 170 local unions in the automotive industry and that "it is the recognized spokesman of American wage workers," a far-fetched statement in view of the fact that it drew support from less than 5 per cent of the automotive workers already polled by Dr. Wolman's board.



TIME IS VALUABLE AS A COST SAVING FACTOR

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MAKING TIME  
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AFFORDS A MEANS  
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IN KEEPING WITH MODERN  
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# THIS WEEK IN WASHINGTON

*Administration becoming increasingly irritated at organized labor's tactics. Resents creation of obstacles in path of recovery.*

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*Supreme Court's gold clause decision expected to provide at least temporary aid to business confidence.*

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*Steel and other industries present potent arguments against 30-hr. week legislation.*

° ° °

*Senator Wagner to introduce labor relations bill which is even more partial than its predecessor to organized labor.*

° ° °

*Business interests called in to advise on expenditure of proposed \$4,880,000,000 work relief fund.*

° ° °  
BY L. W. MOFFETT

Resident Washington Editor,  
The Iron Age

° ° °

WASHINGTON, Feb. 19.—Despite the recent Presidential pat on the back given the American Federation of Labor, it appears evident that the Administration is becoming increasingly irritated at the Federation's tactics. . . . The Administration wants recovery more than it wants anything else, not excluding unlimited resort to the \$4,880,000,000 "work relief" fund. . . .

But recovery's emergence around the more or less mythical corner is being delayed by organized labor's swashbuckling. . . . Threats of widespread strikes in the steel, automobile and textile industries

are greatly discounted, but they are far from reassuring to industry. . . . Sporadic outbreaks would not come as a surprise. . . . The weakness of organized labor in the steel and automobile industries in particular indicates that strikes would not get far, though obviously they might seriously retard recovery. . . .

The split within the ranks of organized labor itself, especially marked in the case of the Spang and Tighe groups in the Amalgamated Association of Iron, Steel and Tin Workers, which was plainly revealed at the Washington sessions of the Federation's executive council, has given organized labor a chill in its plans for another "drive" to unionize the automobile and steel industries, and the cooler heads are concerned over the White House attitude of impatience. . . . The more radical element, however, is urging organized labor to pro-

ceed with plans of setting up local unions under Federal charters, and ousting the more conservative heads of existing unions. . . . And as some of the most militant forces are high in the council of the Federation, it is finding its hand forced. . . .

Speaking campaigns to arouse labor call for a big hullabaloo in the form of a mass meeting and nation-wide broadcast in Detroit, Feb. 24, to rally forces in the automobile and steel industries. This promises to develop a more bitter contest within factions of organized labor than between organized labor and the affected industries. . . . The stirring up of trouble in two great key industries has had the effect of considerably changing the Administration's attitude toward organized labor which has been extremely sympathetic heretofore and is yet to a large degree. . . . Labor's insistence upon the

30-hr. week bill, and other proposed legislation, which, if enacted, would knock recovery into a cocked hat, is also a source of Administration concern. . . .

These factors put together point to an early showdown between the Administration and labor, similar to those which have come to a head in prior administrations which have also been sympathetic to organized labor. . . . Vice-President Thomas R. Marshall once referred to the White House as Gompers' headquarters but the headquarters had moved before President Wilson had completed his second term. . . . Unless recovery speeds up there is fear, expressed quietly within some New Deal circles, of dangerous inflationary movements, such as the new banking program, not to speak of the \$4,880,000,000 outpouring. . . . The Administration wants recovery to win the race, first for the sake of the country itself. . . . Then, too, going into a political campaign with recovery still obscure, unemployment lagging, and a great mass of the population living on Federal doles, would be a bad handicap for success at the polls.

#### Business Advice on Huge Expenditures

While Capitol Hill rang with criticism against putting any strings on Presidential expenditure of the proposed \$4,880,000,000 work relief fund, Secretary of Commerce Daniel C. Roper announced that the President had agreed readily to give business a voice in directing the works relief plan. Approval was given by the President to the appointment of Gen. Robert E. Woods, president, Sears, Roebuck & Co., as chairman of an advisory committee to work with the Administration in allocating the funds. It was indicated that the allocation will be determined by a board set up by the President and that General Wood may be a member of the board as a representative of the Business Advisory and Planning Council of the Department of Commerce.

The council is made up of prominent business men and industrialists and is headed by H. P. Kendall, Boston merchant. Secretary Roper announced that President Roosevelt said he would like to have a committee of business men act in an advisory capacity with the board administering the works relief funds. With this end in view, Mr. Kendall made arrangements to select the committee of business men, to be made up of members, as well as non-members, of the advisory council.

#### Automobile Labor Board Reports on Its Activities

"The opportunities which now exist in the industry for employees to present their grievances and to have them considered and disposed of in joint conference are of inestimable value to automobile workers and are so regarded by them." This extract is taken from the report of the Automobile Labor Board covering its activities during its first 10 months of existence. The report was made to President Roosevelt.

The quoted statement is one of many reflecting the good work done by the board. This is the board so bitterly assailed by the American Federation of Labor, which wants the ALB abolished. This is the board which was given the praise that damns by the NRA-Bureau of Labor Statistics report on production and employment conditions in the automotive industry. Yet the ALB shows a record unequaled by any other labor board in existence. It handled 2035 cases. Of these 1061 were settled without as much as a hearing. The extract is part of a discussion in the report on collective bargaining and shows how far both the industry and employees have gone in negotiating settlements by this means. In itself the showing is so creditable as to justify continuance of such a board.

#### Automotive Trade Pleased with Brazilian Reciprocal Agreement

The Automobile Manufacturers' Association has congratulated Secretary of State Hull on the American-Brazilian reciprocal tariff agreement, which is yet to be ratified by the Brazilian Congress, though this is believed to be only a formality. Automotive makers not only look with pleasure upon this arrangement as opening the way for further development of their trade in Brazil but as a forerunner to a principle of bargaining for widespread expansion of world trade for which the automotive industry long has insisted.

American makers of automobiles and motor trucks stand in a special class in meeting world competition and have made a remarkable record by reason of extensive research work, vast progress in engineering accomplishment and in aggressive salesmanship. Not only is the industry able to keep imports to an almost negligible point but it has developed broad exports markets. Hence its tariff policy is quite different from that of other American basic industries.

It is the view of the automotive industry that the reciprocal agree-

ment with Brazil establishes a principle looking to a system of barter which will mean greatly increased sales of American cars and trucks. This, of course, depends upon the form of exchange. If the barter calls for acceptance of greater imports of products competitive with American industries the loss to domestic makers of sales, employment and purchasing power, now built upon efficiency in output, high wages and reasonable hours, would more than offset gains in export markets.

#### Farm Equipment Imports Increase

While amounting to only \$1,921,230, imports of agricultural equipment into the United States registered a value increase of 98 per cent in 1934, compared with 1933 imports valued at \$968,049. These figures, announced by the Machinery Division of the Department of Commerce, show that the outstanding features of the trade last year was the increased imports of tractors which totaled 364 units, valued at \$151,000, compared with 69 units, valued at \$34,000, in 1933. Canada accounted for 309 units, valued at approximately \$135,000, while the remaining imports originated in Switzerland and the United Kingdom.

#### Gold Decision to Help Business

Entirely aside from political wishful hoping, the view of economists in Washington is that the Supreme Court decision in the gold clause case will be helpful to industry. This view is based on the contention that the decision will mean definite stabilization of the dollar and thus remove an uncertainty as to its value which has been an important element in restraining activity in financing. Both borrower and lender have been hesitant about investing so long as the dollar was of uncertain value and was subject to still further devaluation below its present level, fixed at 59.1 per cent of its old value.

By the narrow margin of 5 to 4, the Government won its case, but in effect, was warned against tinkering further with the currency. It was held in substance that the resolution of Congress that Government obligations need not be paid in gold was invalid, yet apparently the door was closed to action to recover alleged damages. No sovereign government, of course, can be sued without its consent. The Court took the view that the action having been taken, it would be passed by but the implication was that the privilege of (CONCLUDED ON PAGE 72)



## Steel and Other Industries Oppose Proposed 30-Hr. Week Legislation

WASHINGTON, Feb. 19.—Steel has joined the parade of other American industries before a subcommittee of the Senate Committee on Judiciary in vigorous opposition to the Black-Connelly 30-hr. week labor bill. The case of the steel industry was presented last Friday by Walter S. Tower, executive secretary, American Iron and Steel Institute. His testimony was a résumé of studies made by the institute, heretofore published, and was also similar to the statement made by Charles R. Hook, president, American Rolling Mill Co., at recent hearings on employment provisions in codes before the National Industrial Recovery Board.

Mr. Tower, urging that the bill should not be favorably reported by the committee, said that a maximum of 30 hr. per week, with an operating rate of 70 per cent, would require 699,000 wage earning employees, or 329,000 more than the average for 1934 and 279,000 more than the number employed in 1929. He also pointed out that a large proportion of the necessary additional employees would have to be highly skilled workers. Considerably difficult, it was stated, was experienced in building the payroll up to the number required even for an operating rate of 57 per cent in May and June of 1934.

### Employees Not Available

"Positively no such supply of experienced workers could be found in the country as would be required for a reasonably good rate of operations under a limit of 30 hr. per week."

Mr. Tower declared that without materially increased rates of pay per hr., the effect of a 30-hr. week would be to freeze the earnings of employees at or below a bare subsistence level. During 1934, with the operating rate averaging 37 per cent and a work week limited to 40-hr. by the steel code, Mr. Tower said, wage earning employees in the steel industry actually worked an average of only 29.5 hr. per week, which at the average rate of earnings per hr. meant an average weekly pay envelope of \$18.53 per wage earning employee. He declared that the best actual average work week that could be reached under a 30-hr maximum week probably would be not more than 28-hr., which if in effect during 1934 would have reduced the average weekly pay envelope of

wage earning employees to \$17.58. If the rate of pay per hr. under a 30-hr. week were to be increased to provide weekly earnings equal to those under the 40-hr. week, it was stated, the increased labor cost alone in the steel industry would be \$185,000,000 for a year of low operations such as 1934.

"Shorter hours would also entail less efficient plant utilization, which, together with the increased cost burden on the steel industry and lower efficiency by reason of inexperienced employees, would mean a decrease in output per worker and an increase in production costs per unit."

"The result would be either ultimately higher prices for the consumer or greater losses for the producer," said Mr. Tower. "All industries would be affected alike, and when the increased costs had gone around the circle, the real income of labor, measured by purchasing power, would certainly be no more than before. Decreased purchasing power would retard business and slow down recovery."

### Manufacturers' Association Opposes Bill

Speaking for industry generally, James A. Emery, general counsel, National Association of Manufacturers, told the subcommittee that the bill involved fundamental issues of political power more serious than economic recovery.

"It is far more drastic than Senator Black's original proposal, and fixes a definite limit to the earning power of every wage earner in the United States by

threatening a Government boycott and criminal punishment of any employer giving more work than the bill permits," said Mr. Emery. "No similar measure has ever been suggested anywhere under free institutions."

Speaking for the automotive industry, Robert C. Graham, vice-president, Graham-Paige Motor Co. and director of the Automobile Manufacturers' Association, told the committee that the bill would lower the standard of wages, increase the cost of the product to the consumer and possibly bring about a buyers' strike, thus defeating the progress already made in getting men back to work.

### Would Also Damage Farmer

A uniform 30-hr. week would work damage to the farmer as well as to the industrial worker, the subcommittee was told by F. H. Clausen, president, Van Brunt Mfg. Co., Horicon, Wis., agricultural machinery maker. Appearing as a director of the Chamber of Commerce of the United States, Mr. Clausen declared that the increased labor costs that would result from the 30-hr. week would be reflected in an advance of 20 per cent above present levels in prices to farmers for their needed equipment.

It was pointed out that the bill would have particularly injurious effects on small industries and upon workers located in small communities because the percentage of increase in labor costs would be greater for small concerns, and the limitation on hours and wages would deprive their employees of opportunities to increase their earnings. Mr. Clausen also said the effect of the proposed legislation would be to prevent the continuance of voluntary cooperation of industry and thereby defeat the purpose of the National Industry Recovery Act.

## Locomotive Appliance Makers Will Not Infringe on Competitors' Designs

WASHINGTON, Feb. 19.—The NIRB has approved an amendment to the code of fair competition for the locomotive appliance industry, a division of the machinery and allied products industry, which provides that no manufacturer shall make any product of the industry, identical with that originally designed by another manufacturer and bearing his name or trade-mark, without clearly showing, by tag or otherwise, that such product was not made by the original manufacturer; also, that detailed drawings of the products of the industry shall not be

furnished to purchasers, though general drawings may be so furnished. Opportunity to be heard was duly noticed to all interested parties. No objections were received.

### CAN MANUFACTURING

The code authority for the can manufacturing industry has made application for approval of its \$70,850 budget and the basis of contribution. The basis of contribution is set at \$2.25 per employee, based upon average number of employees for the period of April 7 to Dec. 15, 1934.

### WIRE, ROD AND TUBE DIE

Pending approval of the industry's



1935 code budget, the wire rod and tube die industry code authority has been given permission to collect past due contributions and to expend surplus funds in order to defray code administration expenses to April 1, 1935.

#### MANGANESE

An amendment to the manganese industry's code, permitting a maximum 48-hr. week for hoist, pump and power house men, has been approved by the NIBR. Operations in the industry require these employees to work beyond the code's basic 40-hr. maximum.

#### CLAY MACHINERY

The code authority for the clay machinery industry has applied for termination of budget exemptions under Administrative Order X-36, which provides that members of industry need contribute only to the code covering their main line of business. Suggestions or objections concerning the application must be submitted before March 5 to Deputy Administrator Neal W. Foster, 539 Investment Building.

#### METAL SAFETY TREAD

The NIBR has approved a fair trade practice appendix for the metal safety tread manufacturing industry, a subdivision of the fabricated metal products and metal finishing and metal coating industry, effective Feb. 25. The appendix provides for a definition of the industry, a governing body to be known as the subdivisional committee for the metal safety tread manufacturing subdivision, and trade practice provisions including a system of open price filing.

#### FAN AND BLOWER

The code authority for the fan and blower industry has made application for approval of its proposed \$14,600 budget, and the basis of contribution, for the period from Jan. 1, 1935, to Dec. 31.

#### COMMERCIAL VEHICLE BODY

The code authority for the commercial vehicle body industry has submitted an application for an amendment to the code, as follows: Article II, Definitions: That the words "(except those manufactured by or sold to the manufacturer or assembler of motor vehicle chassis)," inclosed in brackets in paragraph 1, be stricken out and the following wording substituted in lieu thereof: "(except those manufactured by automobile manufacturers or assemblers and those manufactured by manufacturers who sell exclusively to automobile manufacturers or assemblers)."

A public hearing will be held March 5, in room 128, Willard Hotel, on the proposed amendment.

#### SHOVELS

The code authority for the shovel, drag-line and crane industry has made application for approval of a \$17,435 code administration budget for the period Jan. 1 to June 30, 1935, and the basis of contribution by industry members to cover said budget.

Specific provisions relating to fine steel are included in amendments proposed for the code for the importing trade on which hearings have been announced by the NIBR before Deputy Administrator A. S. Donaldson beginning March 11. The board has announced recognition of members of the importers' code who will replace the temporary code authority. Among the representatives elected are: Fine steel division, W. D. Thomas, Sandvik Steel,

Inc.; general steel division, William Manealoff, Manealoff & Co., Inc.; machinery division, George Scherr, George Scherr Co.

#### CODE AUTHORITIES APPROVED

The NRA has announced recognition of the following as duly elected members of code authorities:

**Sprocket Chain Industry**—C. W. Spalding, Link-Belt Co., Indianapolis; Brinton Wolsor, Chain Belt Co., Milwaukee; C. R. Heller, Jeffrey Mfg. Co., Columbus, Ohio; Jervis B. Webb, Jervis B. Webb Co., Detroit; and R. R. Fauntleroy, Moline Malleable Iron Co., St. Charles, Ill.

**Horseshoe and Allied Products Manufacturing Industry**—C. H. French, Fowler & Union Horse Nail Co., Buffalo, to succeed Staunton Williams, resigned.

**Washing and Ironing Machine Manufacturing Industry**—C. G. Frantz, Apex Electrical Mfg. Co., Cleveland; E. N. Hurley, Jr., Hurley Machine Co., Chicago; A. H. Labisky, Barton Corp., West Bend, Wis.; L. C. Upton, Nineteen Hundred Corp., St. Joseph, Mich.; J. P. Moynihan, Blackstone Mfg. Co., Jamestown, N. Y., and G. M. Umbriet, Maytag Co., Newton, Iowa.

**Pipe Nipple Manufacturing Industry**—J. L. Williams, Chicago Nipple Mfg. Co., Chicago; D. W. Howe, Ware Coupling & Nipple Co., Ware, Mass.; E. H. Young, Pottstown Pipe Products Co., Pottstown, Pa.; E. J. Graham, Star Nipple Co., Chicago; S. A. Otness, Twin City Steel Mfg. Co., Minneapolis; J. S. Mattimore, Walworth Co., New York; E. A. Gray, Edmund A. Gray Co., Inc., Los Angeles.

**Warm Air Furnace Manufacturing Industry**—H. T. Richardson, Richardson & Boynton Co., New York; Dana W. Norris, Lennox Furnace Co., Syracuse, N. Y.; A. F. Frazee, Rudy Furnace Co., Dowagiac, Mich.; C. Ackerson, Agricola Furnace Co., Gadsden, Ala.

**Warm Air Register Manufacturing Industry**—E. C. Fox, Independent Register Mfg. Co., Cleveland.

**Non-Ferrous Foundry Industry**—D. D. Francis, National Bronze & Aluminum Foundry Co., Cleveland, aluminum permanent mold castings division representative; H. A. White, National Bearing Metals Corp., Pittsburgh, steel and rolling mill castings division representative; H. E. Smeeth, Smeeth-Harwood Co., Chicago, blast furnace castings division representative; N. H. Schwenk, Cramp Brass & Iron Foundries Co., Philadelphia, miscellaneous sand castings division representative; N. K. B. Patch, Lumen Bearing Co., Buffalo, code authority chairman, and A. B. Norton, Aluminum Co. of America, Cleveland.

**Miscellaneous Sand Castings Division of the Non-Ferrous Foundry Industry**—District 1, J. A. Duncan, William Duncan Co., E. Boston; District 2, C. E. Schley, Philadelphia Brass & Bronze Co., Philadelphia; District 3, T. S. Hemenway, Metal and Alloy Specialties Co., Buffalo; District 4, J. P. Jefferis, Shenango Penn Mold Co., Dover, Ohio; District 5, Vaughan Reid, City Pattern Works, Detroit; District 6, F. L. Hayes, Chicago Hardware Foundry Co., Chicago; District 7, Geo. B. Miller, Leffelholz Co., Milwaukee; District 8, C. Wegelin, Dixie Bronze Co., Birmingham, Ala.; District 9, Wm. L. Heckmann, National Art Bronze Works, St. Louis; District 10, M. S. Greenberg, M. Greenberg's Sons, San Francisco.

**Steel and Rolling Mill Castings Division of the Non-Ferrous Foundry Indus-**

**try**—H. A. White, National Bearing Metals Corp., Pittsburgh; J. C. McCallum, William H. Barr, Inc., Buffalo; J. L. Wick, Jr., Falcon Bronze Co., Youngstown; F. S. Wellman, Wellman Bronze & Aluminum Co., Cleveland; W. M. Elstun, Hammond Brass Works, Inc., Hammond, Ind.

#### TRADE PRACTICE COMPLAINTS COMMITTEES APPROVED

Organization and procedure plans for the following trade practice complaints committees have been accorded NRA approval:

**Railway and Industrial Spring Industry**—C. L. Hickling, Administration member of the code authority, Pittsburgh; A. S. Henry, American Locomotive Co., New York; H. C. Bughman, Jr., Union Spring & Mfg. Co., New Kensington, Pa.; F. K. Metzger, Standard Steel Works Co., Burnham, Pa.; A. H. Peycke, American Steel Foundries, Wrigley building, Chicago; Harry Wilson, American Spiral Spring & Mfg. Co., Pittsburgh; H. S. Sherman, Fort Pitt Springs Co., Cleveland, and H. A. Noble, Pittsburgh Spring & Steel Co., Pittsburgh.

## Financial Notes

**Pittsburgh Screw & Bolt Corp.**, in a preliminary report for year ended Dec. 31, 1934, showed net profit, after all charges, of \$203,147, equal to 41c. a share on 1,434,553 shares of capital stock outstanding. This compares with net loss of \$143,700 in 1933.

**Allegheny Steel Co.** had net income from operations in 1934 of \$835,927, after all operating and commercial expenses and provisions for depreciation. Total sales in 1934 were \$17,258,657, compared with \$11,853,199 in 1933.

**National Bearing Metals Corp.**, St. Louis, in year ended Dec. 31, 1934, had net earnings of \$329,551, as against \$372,031 in 1933. Current assets of \$2,672,040 and current liabilities of \$468,856 were reported.

**Belden Manufacturing Co.**, Chicago, had 1934 net income of \$180,935, or \$9.68 a share on the common stock. In previous year, net income was \$210,520, or \$11.27 a share.

**Chicago Railway Equipment Co.**, Chicago, had net profit in the year ended Dec. 31, 1934, of \$61,290. Earned surplus, as of Dec. 31, 1934, stood at \$96,563, compared with \$35,274 on the same date in the preceding year.

The Werra Aluminum Foundry Co., Waukesha, Wis., manufacturer of heavy aluminum castings, has been placed in friendly receivership on order of the Waukesha County Court as a preliminary to reorganization. The assets sequestration and the attempt at reorganization were begun only after a searching survey conducted by a firm of Chicago engineers disclosed excellent possibilities of rehabilitation, which would be difficult to effect by the simple addition of working capital.

Scullin Steel Co., St. Louis, had a loss of \$304,926 in 1934, compared with a loss of \$609,325 in 1933. A net operating profit of \$98,250 was more than offset by a charge of \$93,857 for maintenance of unoccupied plant and miscellaneous charges against income totalling \$36,123. The income statement shows a loss of \$23,871 before addition of \$281,055 for interest on the company's first mortgage and debenture bonds.

# Wagner Bill, More Objectional Than Ever To Be Reintroduced

THE Wagner bill, like the cat, has come back. Under the designation "National Labor Relations Act," the measure which was so bitterly fought by industry last year has been prepared for reintroduction in Congress.

Instead of being couched in a form more acceptable to business interests, the new bill is more pronounced in its pro-organized labor bias than its predecessor. It not only provides for majority rule, but, in effect, makes it mandatory for the employer to make agreements with a majority. It encourages the closed shop, attempts to outlaw "company" unions and gives the successor of the present National Labor Relations Board, to be known by the same name, the power to review decisions of special labor boards, such as the automobile and steel boards.

## Closed Shop Sponsored

The new bill specifically authorizes an employer to make an agreement with a labor organization and to require all employees to join that body, if it is representative of the majority. The proviso in the old Wagner bill that an employer is not bound to make an agreement of this sort is conspicuously absent in the new measure. Instead the new bill makes it an unfair trade practice to refuse to bargain collectively with employee representatives, and makes it clear that collective bargaining means the conclusion of union agreements.

On the last point the wording of the bill is as follows:

"Representatives designated or selected for purposes of collective bargaining by the majority of the employees in a unit appropriate for such purposes, shall be the exclusive representatives of all the employees in such unit for the purposes of collective bargaining in respect to rates of pay, wages, hours of employment or other basic conditions of employment."

The only exception to majority rule is a proviso that representatives of a minority group or groups have the right to bargain collec-

tively until representatives have been selected by a majority.

In plain language this means that if the sole employee organization in a plant is a national labor union, representing a small minority, the management must make an agreement with that body pending the holding of an election. The opportunity this offers an aggressive union to gain a foothold and to capitalize that advantage in winning adherents in a subsequent election is obvious to all familiar with the time-worn tactics of organized labor.

## Selecting "Appropriate" Units for Bargaining

The new bill, like its predecessor, gives the National Labor Board authority to decide whether the unit appropriate for the purposes of collective bargaining shall be the employer unit, craft unit, plant unit or other unit.

The opportunity for mischief in this clause has been previously pointed out. A biased board could confine elections to portions of plants, to separate crafts or even to one mill in which a national union was strongest, and could repeat the elections until the union candidates were chosen.

## New Board Made Supreme Over Other Boards

The new national board is made supreme over all other boards.

Section 6(a) provides that "the board shall have authority and is directed to study the activities of such boards as have been or may be hereafter established by agreement, code, or law to deal with labor disputes and to receive from such boards reports of their activities."

Section 10(b) leaves even less doubt as to the board's authority. It says: "The board may, in its discretion, decline to exercise jurisdiction over any such unfair labor practice in any case where there is another means of adjustment or prevention, provided for by agreement, code or law, which has not been utilized. But in any case where the board has so declined,

the board may at any time thereafter institute proceedings under this act or exercise power of review in order to assure the effectuation of the policy of this act and the development of a uniform body of administration and practice thereunder."

Again, in Section 15, it is stated that "wherever the application of the provisions of section 7(a) of the National Industrial Recovery Act . . . or of Public Resolution 44 approved June 19, 1934 (under which the present national, automobile and steel labor boards were created), conflicts with the application of the provisions of this act, this act shall prevail: Provided, that in any situation where the provisions of this act can't be validly enforced, the provisions of such other acts shall apply."

The new bill, unlike its predecessor, makes no exception for employers having less than 10 employees.

## Commerce Broadly Defined

The present measure also is more explicit in defining its jurisdiction. In an attempt to forestall denials of the power of a Federal body to regulate labor relations in manufacture, mining or construction, which have been held as not constituting commerce, the new bill defines the term "affecting commerce" as meaning "in commerce, or burdening or affecting commerce, or obstructing the free flow of commerce, or having led or tending to lead to a labor dispute that might burden or affect commerce or obstruct the free flow of commerce."

The term "labor dispute" likewise has been given a very broad definition, and, if one reads between the lines, the purpose of this new provision is to make it easier for national labor unions to attack company unions. According to Section 2(9), "the term 'labor dispute' includes any controversy concerning terms, tenure or conditions of employment, or concerning the association or representation of persons in negotiating, fixing, maintaining, changing, or seeking to arrange terms or conditions of



employment, regardless of whether the disputants stand in the proximate relation of employer and employee."

(Editor's note: Italics are ours.)

#### Made Independent of Department of Labor

The present Wagner bill provides for a national labor board of only three members appointed by the President, and having no other business, vocation or employment. The original Wagner bill provided for a board of five, consisting of three neutral members and one representative each of employers and labor to be selected from a panel of six appointed by the President.

The national board, under the present bill, is to be an "independent agency of the executive branch of the Government." In the Wagner bill of last year the board was placed in the Department of Labor.

The new bill is more drastic than its predecessor in the conditions it imposes on alleged violators of its provisions. A person charged with engaging in unfair labor practices can be required to appear at a

hearing not less than three days after being served with a complaint.

As in the old bill, the board's factual findings, if supported by evidence, are conclusive. The new bill goes a step further in providing that an appeal shall not operate as a stay on the board's order unless specifically ordered by the court.

#### Partisanship Does Not Invalidate Arbitration Awards

Arbitration awards, under the new bill, may be impeached if it can be shown that an arbitrator or a member of the board participating in the award was guilty of fraud or corruption, or that a party to the award practiced fraud or corruption which affected the result. However, this clause is conditioned by the following new and important proviso:

"Partisanship known, or which by the exercise of due care, should have been known, by a party prior to the arbitration proceeding, shall not constitute fraud of which he may avail himself within the meaning of this section."

but so far the oscillatory reconciliation has not taken place. Meanwhile the A. F. of L.'s own intentions regarding the Amalgamated association have become suspected. If the federation decides to organize federal unions in the steel industry, what will become of the Tighe organization?

While the general staff of organized labor is wrestling with the problem of proceeding on foot or on horseback, the steel company elections ordered by the steel labor board have been shoved further into the future. When the steel board's decisions ordering the first important employee elections — those at the Duquesne, Pa., and McDonald, Ohio, plants of the Carnegie Steel Co.—were appealed by employee representatives, it was thought that the courts might render decisions within 60 days, or by the first of March. The Department of Justice, however, has asked that these cases be advanced on the docket until the conclusion of another suit growing out of an appeal of rubber companies from election orders of the National Labor Board. It is probable, therefore, that the steel cases will not be taken up until September or later.

A curious development growing out of the controversy in the ranks of organized labor in the steel industry is that the Amalgamated association, having suspended its "Dukane" lodge for participation in the recent "rump" convention, has withdrawn its application for an employee election at the Duquesne plant of the Carnegie company.

Simplified Practice Recommendation R20-28 for steel barrels and drums has been reaffirmed by the standing committee of the industry.

## Steel Labor Situation Grows More Confused

CONFUSION reigns in the steel labor situation. Dissension in the ranks of organized labor, uncertainty as to American Federation of Labor policy, and postponement of pending appeals in steel company election cases have thrown a cloud of ob-

scurity around the trend of industrial relations in the steel industry.

"Rank and filers" have defied the Amalgamated Association of Iron, Steel and Tin Workers. A. F. of L. headquarters have asked the two factions to kiss and make up,



LABOR turnover is not a problem in the Philadelphia foundry of Schneider, Bowman Co., Inc. The nine men shown at left have put in a total of 368 years of service, which we think is pretty nearly a record, at least for a small organization. George Walters, president, with 48 years of service is seated next to the right end of the front row.



# Records of Car Makers Disprove Statements in NRA Report

**D**ETROIT, Feb. 19.—Careful analysis of the Henderson-Lubin report on the automobile industry shows many misstatements of facts as well as gross errors in the figures cited, particularly in the section pertaining to technological advances. Car manufacturers privately are pointing out these blunders which probably occurred largely because the evidence submitted in the report to NIRA was based on hearsay testimony of workers and minor plant officials. The astonishing thing, say motor-car makers, is that the Government should lend its authority and prestige to an attack which stands discredited in the light of official records of facts to the contrary.

## Records Prove Contrary Conditions

Citation of a number of individual cases where man-hours have been drastically curtailed since 1929, by introduction of mechanical processes and improvements in methods of production, is intended "to show the direct effect of decreased employment that results from them," states the report. Yet records compiled by the Automobile Manufacturers' Association and submitted to NRA on March 6, 1934, reveal that 141 man-hr. were required to produce an average automobile in 1933 and 140 man-hr. in 1929. The number of man-hr. in 1934 was approximately the same as in 1933. The reason for the maintenance of the amount of human labor on a steady basis over the last six years is that the smaller cars have been made bigger and better. It is true that the shift in sales demand from heavier cars to lighter ones and the introduction of new machinery have cut down the labor required, but this has been offset by the addition of certain parts such as special radiator grilles, knee action, controlled ventilation and various gadgets.

The report declares that "at present there is a complete elimination of wood parts (from bodies). In eliminating these parts, a certain body manufacturer was able to wipe out his entire wood mill, which in 1928 employed 3000 men." Car manufacturers assert that there is no body built today (not even the so-called all-steel body) which does not contain some wood

parts. So far as the elimination of the wood mill is concerned, the loss in employment there was compensated for by the increased use of steel and the additional workers needed in steel fabricating departments.

## Auxiliary Parts in Tops

Production of a one-piece steel underbody and one-piece steel top has done away with 50 hr. and 48 hr. of labor, respectively, according to the report. Body makers are understood to be at a loss to know where the investigators got such figures, as there has hardly been a total of 50 hr. of labor necessary at any time to manufacture an entire body. Moreover, the report indicates that 47 individual parts formerly making up the top have been replaced by the one-piece top, not taking notice of the fact that a number of auxiliary parts, all of which require considerable labor, still are used.

Cost of tools, dies, jigs, fixtures and shaper forms for an average 1928-29 four-door sedan was \$75,000, declares the report, but manufacturers claim that this figure is entirely too low. They likewise point out that labor cost of a door in 1929 was nowhere near the \$4 named in the report, because, proportionately that would have made the cost of the entire body prohibitive.

Although the cost of making a body is less today than in 1929, as pointed out in the report, the inference is wrong that this saving can be chalked up entirely to reduction in man-hours. A reduction in commodity prices, in the retail prices of cars and in profit margins has played a part in this development. While it is true that a marked reduction has been effected in the number of operations necessary for building certain parts, the present operations are often complicated and cost plenty.

## Much Buffing Still Needed

The assertion is made in the report that "automatic buffing and polishing machines are fast eliminating the hand operation of buffing and polishing." Specific examples then are presented to show that this machinery is throw-

ing men out of jobs. Entirely contradictory to the implied over-all effects of creating vast unemployment is the experience of one of the industry's most prominent automobile hardware makers. This company today is employing more polishers and buffers than in 1929, despite the introduction since then of automatic machines. The explanation is that there is more hardware on today's cars and much more plated material which has to be polished and buffed. Addition of these parts, such as ratchets and knobs, has more than compensated for the loss in man-hour by the use of automatic equipment.

Much is made in the report over the matter of the so-called "speed-up." But nothing is said about the fact that meticulous studies have been conducted over a period of years in eliminating unnecessary motions on the part of the worker and in bringing parts by conveyors directly to him so that operations can be accelerated without causing any greater physical effort than before on his part. The speeding up of a line should not be taken in itself as evidence of inhuman physical demands being made on the worker.

## Low Annual Income Result of Spreading Work

The low annual incomes of workers of certain companies, as revealed in the report, are looked upon by the industry as proof that the "spread-work" idea of limiting hours doesn't give the individual worker a sufficient income, despite the high hourly rates. As a result of this situation, it can be authoritatively stated that one large company intends to work most of its employees the full 48 hr. allowed under the code throughout the more active months of 1935, giving them a chance to earn more money than heretofore.

Although the Henderson-Lubin report would seem, on the surface, to reflect the Government's opinion on fundamental policies in the automobile industry, actually it cannot be taken as such. Clearly the letter of President Roosevelt on Nov. 21, asking that an investigation be made, inferred that the industry would be accorded an opportunity for rebuttal. He declared that no action would be taken "until ample opportunity has been given to interested parties to review the results of this study and to present their views on the questions involved." Hence a formal statement by the industry replying to the report is expected in the near future.

# OBITUARY

F. CONRAD WITTICH, president, Cleveland Tool & Supply Co., died Feb. 7, after a long illness, age 65 years. With C. C. Coventry he organized the company in 1898 and served as its vice-president until 1930, when Mr. Coventry died. He then succeeded Mr. Coventry as president.

♦ ♦ ♦

JAMES H. KESSACK, who became identified with the Pennsylvania Steel Co. in 1908, and then with the Bethlehem Steel Co., died at his home in Bethlehem, Pa., on Feb. 15, aged 49 years.

♦ ♦ ♦

FREDERICK W. VILMAR, vice-president and treasurer of the American Stamping Co., Cleveland, died Feb. 13, after a long illness. He was one of the organizers of the company in 1922. Before that he was sales manager of the former Parrish & Bingham Co., Cleveland. He was 53 years old.

♦ ♦ ♦

CLEMENT C. SMITH, prominent Milwaukee industrialist and management engineer, died Feb. 14 at his winter home in Pasadena, Cal., aged 69 years. He was born in Cleveland and after studying engineering became associated with the Milwaukee Electric Railway & Light Co. in 1895, later joining the Falk Corp. At the outbreak of the World War, Mr. Smith and associates acquired the Baltimore Shipbuilding & Dry Dock Co., and

built a large tonnage of war vessels for the Government. Mr. Smith was one of the founders and until his death chairman of the board of the Heil Co., Milwaukee.

♦ ♦ ♦

DAVID F. NOBLE, for a number of years Chicago representative for the Foote-Burt Co., Cleveland, died Feb. 16. He was born at New Boston, Ill., Oct. 11, 1883, and before becoming connected with Foote-Burt was with the Marshall & Huschart Machinery Co., Chicago.

## Opposes Economic Security Bill

ADOPTION of the proposed economic security bill would add 5,830,000 recipients of Federal funds to the 7,920,000 persons already receiving such funds regularly, making a total of 13,750,000 recipients of Federal cash benefits, while there would be "an additional 23,920,000 who would look to the Government for future aid under the social security bill," Noel Sargent, secretary, National Association of Manufacturers, has told the Senate Finance Committee.

He brought out, incidentally, that the proposed soldiers' bonus would add 3,550,000 beneficiaries to the Federal fund, a grand total of

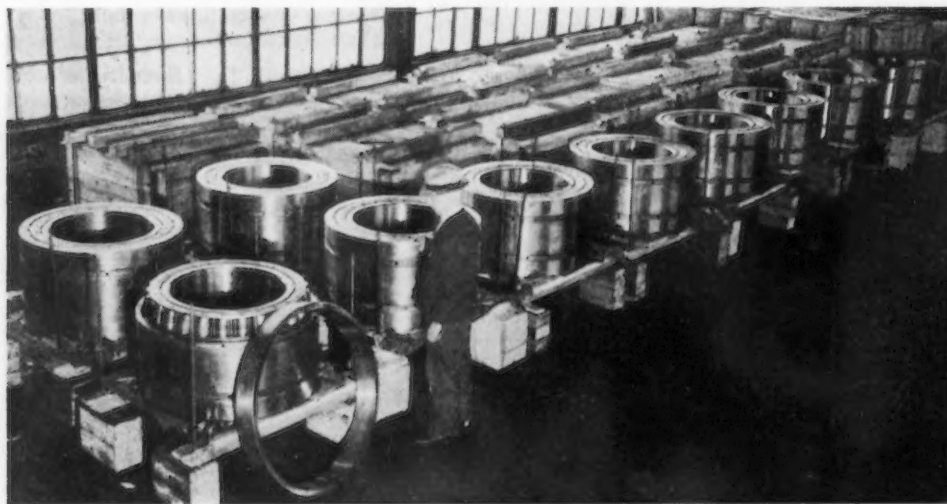
17,300,000, actually, and 23,920,000 "in line" for future benefits.

"This is a total of 41,220,000 persons who, either under existing or proposed laws, would look to the Federal government for some measure of support—a number greater than all who voted for President in 1932," said Mr. Sargent. He added that some duplications entered into the figures as tabulated, but that duplications are offset by failure to include recipients of benefit payments from the AAA.

British experience with unemployment insurance was cited by John C. Gall, associate counsel, National Association of Manufacturers, as a warning to the United States not to rush into similar errors in the midst of the depression. Mr. Gall made a study of social legislation in Great Britain last fall. James A. Emery, general counsel of the association, previously had discussed the legal phases of the bill.

In general the association's position upon the legislation is that sufficient study has not been given to the question to produce a sound bill which will accomplish the objective for which it is designed. Reliable information in this country upon the extent and causes of unemployment is entirely lacking.

Lincoln Steel Products Corp., 60 East Forty-second Street, New York, has been incorporated by Emanuel Voss, M. W. Amberg, W. C. Hays and C. H. Brushaber to deal in new, surplus and defective steel materials and metals of all kinds. Firm will engage in both export and domestic business.



TWENTY-THREE of the 1400 Timken Tapered roller bearings which will be used in the new Ford steel mill are shown here ready for shipment.

Fifty-two bearings of the size shown (25½ in. x 40½ in.), each weighing 4086 lb., will be installed on the back-up roll-necks of the 21 in. and 46 in. x 56 in. four-high hot strip mills and on the back-up roll-necks of the 18 in. and 46 in. x 56 in. tandem cold strip mills. The loads on the back-up roll-necks of the 20½ in. and 56 in. x 84 in. single stand reversing cold mill will be carried by four similar 30 in. x 47 in. bearings.

In all, 185 tons of Timken bearings will be used in the new Ford mills, now being built by the United Engineering & Foundry Co. of Pittsburgh. It is believed that this is the largest single order for steel mill anti-friction bearings ever placed.



## Hearing on Republic Merger Injunction Postponed

THE hearing in the injunction proceedings brought by the Government to prevent the proposed merger of Republic Steel Corpn. and Corrigan McKinney Steel Co. has been continued until March 18, as the result of an agreement reached between the office of the Attorney General of the United States and the steel company attorneys. In the suits, as originally filed by the Government, defendants were ordered to be prepared for a hearing on a temporary injunction on Feb. 19. Under the terms of a stipulation filed Feb. 18 the hearing on the temporary injunction will not be held and the case will be continued and tried on its merits at the later date.

The steel companies have agreed not to proceed further toward the consummation of the merger until after the final determination of the case by the court. The defendants have until Feb. 28 in which to file their answer.

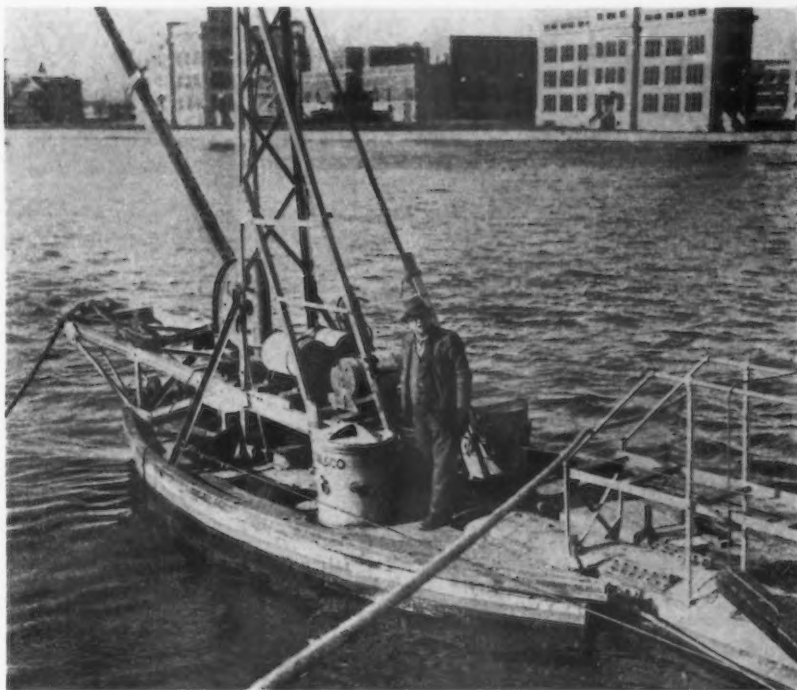
## Steel Corporation to Spend \$47,000,000

UNITED STATES STEEL CORPN. has endorsed recommendations of subsidiary companies for appropriations for capital expenditures to the amount of \$47,000,000 for improvements, alterations and modernization of their finishing plants.

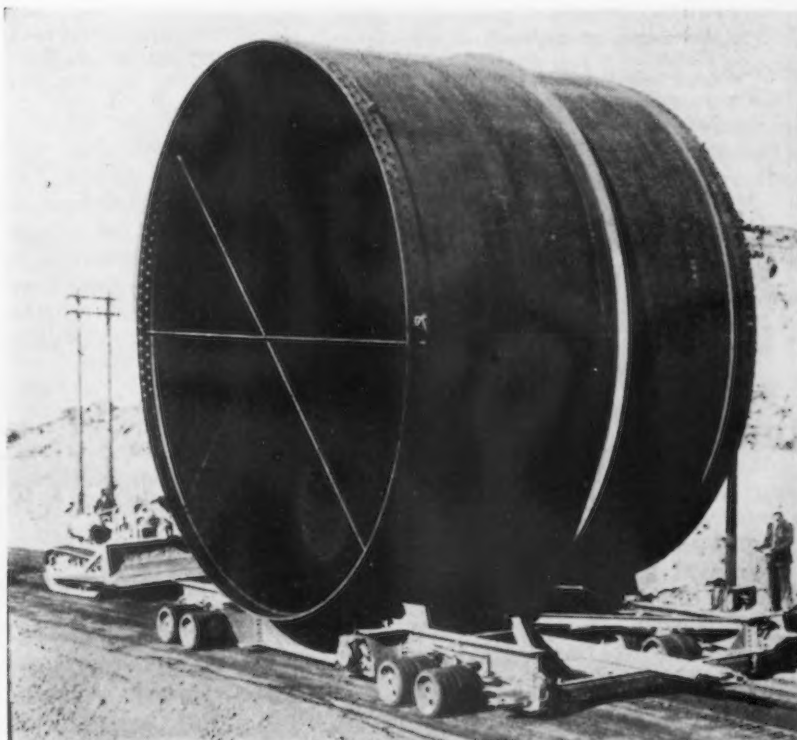
## Prices on Structural Pipe Reduced

NEW basing discounts filed on butt-weld light-wall pipe (0.84 in. O.D. to 2.50 in. O.D.) for structural purposes have been increased effective Feb. 19. On galvanized the new discount at Gary is 49 and 5 and 5 per cent off as compared with the old price of 46 and 5 and 5 off. On black the new discount is 58 and 5 and 5 off as against the former quotation of 55 and 5 and 5 off.

The annual general meeting of the American Iron and Steel Institute will be held in New York on May 23. Headquarters of the Institute are in the Empire State Building, New York.



SIMON LAKE, the submarine man, is standing on the deck of his newest baby. It is a miniature submarine which has a 117 ft. tube attached through which a diver on salvage work has quick access to a wreck. A demonstration of coal salvage was made recently in the East River, New York



WONDER how the fellow in the auto is going to get by? Maybe he will have to back up a couple of miles to a cross road. Unless, of course, he can persuade the tractor man who is pulling this Hoover Dam penstock pipe section to pull over to his own side of the road.



# Monthly Report of Metal Working Activity

These Data Are Assembled By THE IRON AGE From Recognized Sources And Are Changed Regularly As More Recent Figures Are Made Available. Boldface Type Indicates Changes This Week

	January, 1935	December, 1934	January, 1934	1935 to Date	Year 1934
<b>Raw Materials:</b>					
Lake ore movement (gross tons) <sup>a</sup>					22,249,600
Coke production (net tons) <sup>b</sup>		*2,501,441	2,583,685		*31,830,210
<b>Pig Iron:</b>					
Pig iron output—monthly (gross tons) <sup>c</sup>	<b>1,477,336</b>	1,027,622	1,215,226	1,477,336	15,911,188
Pig iron output—daily (gross tons) <sup>c</sup>	<b>47,656</b>	33,149	39,201	47,656	43,592
<b>Castings:</b>					
Malleable castings—production (net tons) <sup>d</sup>		32,746	30,417		369,458
Malleable castings—orders (net tons) <sup>d</sup>		36,505	32,501		354,146
Steel castings—production (net tons) <sup>d</sup>		23,916	27,644		450,087
Steel castings—orders (net tons) <sup>d</sup>		27,312	26,296		434,131
<b>Steel Ingots:</b>					
Steel ingot production—monthly (gross tons) <sup>e</sup>	<b>2,834,170</b>	1,941,595	1,971,187	2,834,170	25,263,569
Steel ingot production—daily (gross tons) <sup>e</sup>	<b>104,969</b>	77,664	73,007	104,969	81,233
Steel ingot production—per cent of capacity <sup>e</sup>	<b>47.67</b>	35.27	33.16	47.67	36.89
<b>Employment in Steel Industry:</b>					
Total employees <sup>f</sup>		386,345	393,013		409,348
Total payrolls <sup>g</sup>		\$35,362,732	\$34,877,542		\$457,842,517
Average hours worked per week <sup>h</sup>		28.4	30.3		30.5
<b>Finished Steel:</b>					
Trackwork shipments (net tons) <sup>i</sup>	<b>2,333</b>	2,272	2,811	2,333	49,110
Sheet steel sales—(net tons) <sup>j</sup>		193,130	209,463		1,830,682
Sheet steel production (net tons) <sup>j</sup>		159,740	163,622		1,895,460
Fabricated shape orders (net tons) <sup>k</sup>		67,799	91,594		1,054,382
Fabricated shape shipments (net tons) <sup>k</sup>		88,687	57,623		1,116,222
Fabricated plate orders (net tons) <sup>d</sup>		26,025	15,897		241,992
Reinforcing bar awards (net tons) <sup>e</sup>	<b>15,600</b>	7,650	17,800	15,600	177,350
U. S. Steel Corp'n. shipments (tons) <sup>l</sup>	<b>534,055</b>	418,630	331,777	534,055	5,925,873
<b>Fabricated Products:</b>					
Automobile production U. S. and Canada <sup>d</sup>		185,919	163,811		2,895,629
Construction contracts (37 Eastern States) <sup>l</sup>	<b>\$99,773,900</b>	\$92,684,900	\$186,463,700	\$99,773,900	\$1,543,102,300
Steel barrel shipments (number) <sup>d</sup>		424,233	206,347		6,682,400
Steel furniture shipments <sup>d</sup>		\$1,090,171	\$996,838		\$11,807,843
Steel boiler orders (sq. ft.) <sup>d</sup>		259,875	235,776		4,368,563
Locomotive orders (number) <sup>k</sup>	<b>0</b>	0	0	0	183
Freight car orders (number) <sup>k</sup>	<b>24</b>	360	150	24	24,611
Machine tool index <sup>m</sup>	<b>65.5</b>	66.1	53.7	65.5	46.2
<b>Foreign Trade:</b>					
Imports of pig iron (gross tons) <sup>m</sup>		3,642	11,886		115,470
Imports of rolled steel (gross tons) <sup>m</sup>		6,274	7,183		100,562
Exports of all steel (gross tons) <sup>m</sup>		85,013	89,798		997,210
Exports, finished steel (gross tons) <sup>m</sup>		78,137	78,818		833,559
Exports of scrap (gross tons) <sup>m</sup>		196,361	87,272		1,835,554
<b>British Production:</b>					
British pig iron production (gross tons) <sup>n</sup>	<b>521,200</b>	513,500	441,300	521,200	5,978,500
British steel ingot production (gross tons) <sup>n</sup>	<b>757,800</b>	654,500	711,000	757,800	8,860,700

\* Preliminary.  
Sources of figures: <sup>a</sup> Lake Superior Iron Ore Association; <sup>b</sup> Bureau of Mines; <sup>c</sup> THE IRON AGE; <sup>d</sup> Bureau of the Census; <sup>e</sup> American Iron and Steel Institute; <sup>f</sup> National Association of Flat-Rolled Steel Manufacturers; <sup>g</sup> American Institute of Steel Construction; <sup>h</sup> United States Steel Corp'n.; <sup>i</sup> F. W. Dodge Corp'n.; <sup>j</sup> Railway Age; <sup>k</sup> National Machine Tool Builders Association; <sup>l</sup> Department of Commerce; <sup>m</sup> British Iron and Steel Federation.

## Weekly Indications of Steel Activity

From THE IRON AGE

	Feb. 19, 1935	Feb. 12, 1935	Jan. 22, 1935	Feb. 20, 1934	Average, Year to Date 1934	1934
Steel ingot operations—Per cent of capacity	<b>50.5</b>	53.5	51.5	44.5	50.7	35.7
	Week Ended				Year to Date	
	Feb. 19, 1935	Feb. 12, 1935	Jan. 22, 1935	Feb. 20, 1934	1935	1934
Fabricated structural steel awards	<b>13,250</b>	9,655	12,660	14,925	95,365	116,115
Fabricated plate awards	<b>700</b>	1,130	1,800	1,190	13,770	6,295
Sheet steel piling awards	<b>0</b>	0	1,000	0	2,400	13,065
Reinforcing bar awards	<b>12,800</b>	615	6,750	7,200	32,865	32,000

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## SUMMARY OF THIS WEEK'S BUSINESS

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# Steel Ingot Output and Scrap Prices Again Lose Ground

Production Is Off Three Points to 50½ Per Cent of Capacity—Tone  
Of Scrap Market Improves Despite Widespread Price Recessions

**B**OTH steel production and scrap prices have suffered further declines, ingot output falling three points to 50½ per cent of capacity and scrap, as measured by THE IRON AGE composite price, receding from \$12.17 to \$11.92 a ton. Though recessions in scrap prices have been general, occurring on the steel-making grades in all of the important consuming centers, market sentiment is now strengthening, particularly in the key Pittsburgh district. The change in tone is attributed in part to a purchase of 10,000 tons of heavy melting steel by the leading Pittsburgh consumer, the first purchase from dealers by that interest since April, 1934. The announcement of the gold clause decision also has had a buoying effect.

Among steel makers likewise there are signs of returning confidence. Whether the recent setback in business was due to uncertainty over the gold clause case, to too rapid expansion of raw and semi-finished steel output, to overbuying by consumers, to code limitations on contract buying, or to all of these factors remains a moot question, but the steel trade sees no evidences of an actual decline in consumption and, in certain directions, looks for an expansion of demand above current levels.

**T**HERE are as yet no indications of a relaxation of activity in the automobile industry and, while motor car makers may have ordered more freely than usual so long as they were in doubt as to deliveries available from the mills, it is doubtful whether they have yet reached the peak of their steel requirements. Some of the larger consumers outside of the automotive field, particularly refrigerator manufacturers, also accumulated sizable stocks recently to protect themselves against delays in deliveries. The extent of anticipatory covering, as well as the trend of future demand, will probably not become apparent until after March 1, when books for the second quarter are opened.

Prices thus far filed for the next three-month period show no deviations from present quotations. Sheet mills continue to receive requests for reserva-

tions on rolling schedules pending the time when formal contracts for second quarter can be accepted.

**M**ILDER weather and the completion of new Government financing programs are counted on to stimulate construction, as well as railroad expenditures, in the second quarter. New structural steel projects of 60,000 tons are the largest since the last week of August, 1933. Fabricated steel awards of 13,250 tons compare with 9655 tons in the previous week. Reinforcing bar lettings of 12,800 tons include 7030 tons placed by the Los Angeles water district.

The Southern Railway has awarded 16,000 tons of rails to the Alabama mill, and the Southern Pacific has ordered 6000 tons of tie plates. The Virginian is in the market for 2200 tons of rails. Railroad car repair shops in various parts of the country are taking increasing quantities of steel.

The placing of 32 twin-articulated electric streamlined passenger units by the French Railways and of 15 single-unit Diesel-electric cars by the Northern Railways of Italy for construction abroad under licenses from a Philadelphia builder has been followed by the purchase of stainless steel from an American mill.

**T**HREATS of nation-wide strikes in the steel, automobile and textile industries are discounted, but scattered local strikes with others in prospect are not only hampering production but are unsettling business confidence at a time when capital investment shows signs of revival, as evidenced by the Steel Corporation's announcement of a \$47,000,000 improvement program.

Steel ingot output is off two points to 39 per cent at Pittsburgh, 11 points to 54 per cent at Chicago and five points to 85 per cent in the Wheeling district. Elsewhere operations are substantially unchanged.

THE IRON AGE composite prices for pig iron and finished steel are unchanged at \$17.90 a ton and 2.124c. a lb. respectively.

# A Comparison of Prices

Market Prices at Date, and One Week, One Month, and One Year Previous  
Advances Over Past Week in Heavy Type, Declines in Italics

Pig Iron	Feb. 19, 1935	Feb. 12, 1935	Jan. 22, 1935	Feb. 20, 1934
<i>Per Gross Ton:</i>				
No. 2 fdy., Philadelphia.....	\$20.26	\$20.26	\$20.26	\$19.26
No. 2, Valley furnace.....	18.50	18.50	18.50	17.50
No. 2 Southern, Cin'ti.....	19.13	19.13	19.13	18.13
No. 2, Birmingham†.....	14.50	14.50	14.50	13.50
No. 2 foundry, Chicago*.....	18.50	18.50	18.50	17.50
Basic, del'd eastern Pa.....	19.76	19.76	19.76	18.76
Basic, Valley furnace.....	18.00	18.00	18.00	17.00
Valley Bessemer, del'd P'gh..	20.76	20.76	20.76	19.76
Malleable, Chicago*.....	18.50	18.50	18.50	17.50
Malleable, Valley.....	18.50	18.50	18.50	17.50
L. S. charcoal, Chicago.....	24.04	24.04	24.04	23.54
Ferromanganese, seab'd car-				
lots.....	85.00	85.00	85.00	85.00

†This quotation is for delivery in South; in the North prices are 38c. a ton under delivered quotations from nearest Northern furnace.

\*The switching charge for delivery to foundries in the Chicago district is 60c. per ton.

## Rails, Billets, etc.

<i>Per Gross Ton:</i>				
Rails, heavy, at mill.....	\$36.37 1/2	\$36.37 1/2	\$36.37 1/2	\$36.37 1/2
Light rails, Pittsburgh.....	35.00	35.00	35.00	32.00
Rerolling billets, Pittsburgh.....	27.00	27.00	27.00	26.00
Sheet bars, Pittsburgh.....	28.00	28.00	28.00	26.00
Slabs, Pittsburgh.....	27.00	27.00	27.00	26.00
Forging billets, Pittsburgh.....	32.00	32.00	32.00	31.00
Wire rods, Pittsburgh.....	38.00	38.00	38.00	36.00
	Cents	Cents	Cents	Cents
Skelp, grvd. steel, P'gh, lb..	1.70	1.70	1.70	1.60

## Finished Steel

<i>Per Lb.:</i>	Cents	Cents	Cents	Cents
Bars, Pittsburgh.....	1.80	1.80	1.80	1.75
Bars, Chicago.....	1.85	1.85	1.85	1.80
Bars, Cleveland.....	1.85	1.85	1.85	1.80
Bars, New York.....	2.13	2.13	2.13	2.08
Plates, Pittsburgh.....	1.80	1.80	1.80	1.70
Plates, Chicago.....	1.85	1.85	1.85	1.75
Plates, New York.....	2.08	2.08	2.08	1.98
Structural shapes, Pittsburgh.....	1.80	1.80	1.80	1.70
Structural shapes, Chicago.....	1.85	1.85	1.85	1.75
Structural shapes, New York.....	2.05 1/4	2.05 1/4	2.05 1/4	1.95 1/4
Cold-finished bars, Pittsburgh.....	2.10	2.10	2.10	2.10
Hot-rolled strips, Pittsburgh.....	1.85	1.85	1.85	1.75
Cold-rolled strips, Pittsburgh.....	2.60	2.60	2.60	2.40

On export business there are frequent variations from the above prices. Also, in domestic business, there is at times a range of prices on various products, as shown in our detailed price table. †Blue Eagle copper.

## Finished Steel

<i>Per Lb.:</i>	Cents	Cents	Cents	Cents
Hot-rolled annealed sheets, No. 24, Pittsburgh.....	2.40	2.40	2.40	2.25
Hot-rolled annealed sheets, No. 24, Gary.....	2.50	2.50	2.50	2.35
Sheets, galv., No. 24, P'gh.....	3.10	3.10	3.10	2.85
Sheets, galv., No. 24, Gary.....	3.20	3.20	3.20	2.95
Hot-rolled sheets, No. 10, P'gh.....	1.85	1.85	1.85	1.75
Hot-rolled sheets, No. 10, Gary.....	1.95	1.95	1.95	1.85
Wire nails, Pittsburgh.....	2.60	2.60	2.60	2.35
Wire nails, Chicago dist. mill.....	2.65	2.65	2.65	2.40
Plain wire, Pittsburgh.....	2.30	2.30	2.30	2.20
Plain wire, Chicago dist. mill.....	2.35	2.35	2.35	2.25
Barbed wire, galv., P'gh.....	3.00	3.00	3.00	2.85
Barbed wire, galv., Chicago dist. mill.....	3.05	3.05	3.05	2.90
Tin plate, 100 lb. box, P'gh.....	\$5.25	\$5.25	\$5.25	\$5.25

## Scrap

<i>Per Gross Ton:</i>				
Heavy melting steel, P'gh.....	\$13.00	\$13.25	\$13.50	\$14.25
Heavy melting steel, Phila.....	11.50	11.75	11.75	11.75
Heavy melting steel, Ch'go.....	11.25	11.50	11.75	10.75
Carwheels, Chicago.....	12.00	12.00	12.00	11.75
Carwheels, Philadelphia.....	12.50	12.50	10.75	12.75
No. 1 cast, Pittsburgh.....	13.75	13.75	13.25	12.25
No. 1 cast, Philadelphia.....	11.00	11.00	11.00	12.50
No. 1 cast, Ch'go (net ton).....	10.00	10.00	11.00	9.50
No. 1 RR. wrot., Phila.....	11.00	11.25	11.25	11.00
No. 1 RR. wrot., Ch'go (net).....	9.25	9.50	10.50	9.25

## Coke, Connellsville

<i>Per Net Ton at Oven:</i>				
Furnace coke, prompt.....	\$3.85	\$3.85	\$3.85	\$3.50
Foundry coke, prompt.....	4.60	4.60	4.60	4.25

## Metals

<i>Per Lb. to Large Buyers:</i>	Cents	Cents	Cents	Cents
Electrolytic copper, refinery†.....	8.75	8.75	8.75	7.75
Lake copper, New York†.....	9.12 1/2	9.12 1/2	9.12 1/2	8.00
Tin (Straits), New York.....	50.35	50.75	51.15	52.00
Zinc, East St. Louis.....	3.70	3.70	3.75	4.40
Zinc, New York.....	4.05	4.05	4.10	4.75
Lead, St. Louis.....	3.40	3.35	3.55	3.90
Lead, New York.....	3.55	3.50	3.70	4.00
Antimony (Asiatic), N. Y.....	14.50	14.50	14.50	7.15

# The Iron Age Composite Prices

## Finished Steel

Feb. 19, 1935	2.124c. a Lb.
One week ago	2.124c.
One month ago	2.124c.
One year ago	2.008c.

Based on steel bars, beams, tank plates, wire, rails, black pipe, sheets and hot-rolled strips. These products make 85 per cent of the United States output.

	HIGH	LOW
1934.....	2.199c., April 24;	2.008c., Jan. 2
1933.....	2.015c., Oct. 3;	1.867c., April 18
1932.....	1.977c., Oct. 4;	1.926c., Feb. 2
1931.....	2.037c., Jan. 13;	1.945c., Dec. 29
1930.....	2.273c., Jan. 7;	2.018c., Dec. 9
1929.....	2.317c., April 2;	2.273c., Oct. 29
1928.....	2.286c., Dec. 11;	2.217c., July 17
1927.....	2.402c., Jan. 4;	2.212c., Nov. 1

## Pig Iron

\$17.90 a Gross Ton
17.90
17.90
16.90

Based on average of basic iron at Valley furnace and foundry irons at Chicago, Philadelphia, Buffalo, Valley and Birmingham.

HIGH	LOW
\$17.90, May 1;	\$16.90, Jan. 27
16.90, Dec. 5;	13.56, Jan. 3
14.81, Jan. 5;	13.56, Dec. 6
15.90, Jan. 6;	14.79, Dec. 15
18.21, Jan. 7;	15.90, Dec. 16
18.71, May 14;	18.21, Dec. 17
18.59, Nov. 27;	17.04, July 24
19.71, Jan. 4;	17.54, Nov. 1

## Steel Scrap

\$11.92 a Gross Ton
12.17
12.33
12.25

Based on No. 1 heavy melting steel quotations at Pittsburgh, Philadelphia and Chicago.

HIGH	LOW
\$13.00, Mar. 13;	\$9.50, Sept. 25
12.25, Aug. 8;	6.75, Jan. 5
8.50, Jan. 12;	6.42, July 5
11.33, Jan. 6;	8.50, Dec. 29
15.00, Feb. 18;	11.25, Dec. 9
17.58, Jan. 29;	14.08, Dec. 3
16.50, Dec. 31;	13.08, July 2
15.25, Jan. 11;	13.08, Nov. 22



# Operations Recede Again In Pittsburgh District



Local Rate Falls Two Points to 39 Per Cent While Wheeling Average Drops Five Points to 85 Per Cent—Melting Scrap Declines 25¢ a Ton

**P**ITTSBURGH, Feb. 19.—Raw steel production in the Pittsburgh district this week has declined two points to 39 per cent of capacity. In the Valleys and nearby northern Ohio mills output is fairly steady at 60 per cent. A five-point drop in the Wheeling district places current production at 85 per cent.

The downtrend in steel operations at Pittsburgh, while reflecting in a measure a shrinkage in orders for certain classes of finished steel, also indicates a more conservative mood on the part of producers in viewing the immediate outlook for steel. Finishing mill schedules have not yet followed the lead of raw steel departments. Although pressure in sheet buying has relaxed sheet mills are being taxed to meet delivery dates and this week are operating slightly higher, at 70 per cent. Strip steel mill output is holding at 65 per cent. Tin plate production has slipped five points this week to 70 per cent, but the drop is considered only temporary. The largest loss has occurred in heavy hot-rolled departments, including structural and rail mills.

The opening of second quarter books on March 1 probably will indicate more clearly the early course of consumer demand, since a large number of steel consumers already have covered for the remainder of first quarter and must await establishment of next quarter prices before specifying their future needs. There is little doubt that no immediate revisions in Pittsburgh base quotations will be effected for second quarter shipment.

## Pig Iron

February shipments are a shade heavier than those for the same period in January. Trading, which continues on a spot carload basis, is restricted largely to the general foundry trade. The Shenango furnace is benefiting by a better demand for ingot molds, but the merchant trade in this district manifests no expanding tendencies.

Quarterly contracting appears to be passe, and, with present prices likely to be extended through second quarter, consumers are virtually protected against higher quotations for the next four months.

## Semi-Finished Steel

A fairly substantial movement continues in this market, although the tendency is slightly downward. A slight decrease is noticeable in takings of sheet bars for tin plate conversion. An unbroken flow of semi-finished steel continues, however, to detached sheet mills and strip units. Wire rods are quieter.

## Bolts, Nuts and Rivets

A meager improvement is reported in general releases on first quarter contracts. Prices appear to be firm, and current indications point to unchanged discounts for second quarter. Prices for that period, however, will not be announced for several weeks.

## Rails and Track Accessories

The prospective opening on Feb. 28 of bids on the New York Central's requirements of 20,000 tons of rails and about 9000 tons of track fastenings holds the spotlight in this market. The Virginian Railway is in the market for 2200 tons of rails. The general run of railroad track needs continues at a low point. Unsettled labor and financial questions directly affecting the carriers are hindering any broad purchasing programs.

## Reinforcing Steel

Uncertain weather conditions have hampered progress of some large construction projects, and the effect on mill shipments of reinforcing steel has been marked in the past month. Fresh business has been in light volume, but spring activity in many lines is expected soon to reflect heavier entries on mill order books. Road construction programs probably will provide the largest proportion of spring tonnage. Specifications

for Government postoffices in many instances continue to call for rail steel reinforcing. Award of contract for the Mohawk dam in the Muskingum Conservancy projects has not yet been made. Billet steel reinforcing in straight lengths as quoted by distributors probably will be reaffirmed at 2.05c. a lb., Pittsburgh, for second quarter.

## Cold-Finished Bars

Although several large automobile manufacturers apparently are will stocked for the time being, some motor car makers have not yet reached full production, and cold-finishers look for a fairly steady interest for the remainder of first quarter. Specifications from farm implement manufacturers are slightly heavier. Reports indicate that jobbers' stocks are moving faster, but replenishment buying has not been in proportion to deliveries out of warehouse. No change in the present Pittsburgh base quotations for cold-finished bars is expected for second quarter.

## Bars

With automotive orders appearing less frequently, bar mill schedules have been revised downward slightly. No severe slump in activity is expected, however, since some automotive producers are believed not to have covered fully for their entire first quarter requirements of bars. Miscellaneous business seems to be holding its own. Any hesitancy on the part of buyers at this time cannot be traced to the question of prices, which are expected to be reaffirmed for second quarter.

## Plates and Shapes

The plate market is showing signs of life as a result of heavier seasonal interest in new barge construction, but such activity still is considered sub-seasonal. There are still strong expectations of a broadening in barge requirements with the approach of spring, and a fairly substantial volume already figured awaits placement. About 900 tons of plates will be bought for construction of 12 sand and gravel barges at Charlestown, W. Va. The structural steel market has been enlivened by the appearance of an inquiry for the New York Tri-Borough bridge stiffening trusses, and Queens and Bronx approaches to suspension spans, entailing about 33,000 tons. Federal Government plans will be ready on March 1 for bidding on April 1 on Mississippi River dam No. 26, for which 6000 tons will be purchased. Long Island Railroad grade crossing elimination at Long Island City will take 1500

tons. Recent awards reported in the Pittsburgh district continue to be discouragingly small.

### Wire

Automotive demand has narrowed slightly while miscellaneous interest in manufacturers' wire is fairly well sustained. Jobbers are specifying more freely, but the volume of merchant trade has not expanded significantly. Jobbing stocks in centers serving agricultural areas are expected to be augmented within the next month.

### Tubular Products

February volume is running moderately higher than business in the first three weeks of January. The increase may be charged chiefly to heavier takings by the oil industry. A smaller influence is the pickup in consumption of mechanical tubing in the automotive industry. Locomotive boiler tubes and seamless commercial boiler tubing are being booked in small quantities and are not providing important tonnage to current mill schedules. Standard pipe business also lacks definite importance from a tonnage standpoint. The leading pipe producers expect to reaffirm present discounts for second quarter shipment.

### Sheets

Although specifications from the automotive industry are less urgent, volume of sheet business booked in the past week was in some instances still on an uptrend. Some mills are not able to make delivery on certain finishes for ten weeks, and consequently are not accepting orders until opening of second quarter books on March 1. Miscellaneous demand continues to display strength, with agricultural implement makers notably regular in their takings. Household equipment is another important outlet for sheets. Output in the sheet industry this week is slightly higher at a full 70 per cent of capacity. Important sheet makers have filed current base prices at Pittsburgh for extension to second quarter.

### Strip Steel

Volume of automotive business is virtually unchanged and continues to be the backbone of the current market. Some motor car makers have not covered fully against their early requirements, and some strip producers expect at least to hold present operations of 65 per cent or better for several weeks. Miscellaneous business is satisfactory. In some instances, producers are slightly behind de-

liveries and at least one mill faces the necessity of engaging more capacity. Backlog tonnage has not been reduced to any extent. Leading producers in this district indicate that current base prices for hot and cold-rolled strip will be reaffirmed for second quarter.

### Tin Plate

Specifications are being placed less freely, and output at some mills has been decreased this week. The leading producer has stepped up production but not sufficiently to offset declines in other directions, and the industry will average about five points lower this week at 70 per cent. No serious slump is in prospect, however, since seasonal activity should provide a fairly high and steady rate well into second quarter.

### Coke and Coal

This market reflects little change. The movement of furnace and foundry coke in this district continues on a restricted scale. Beehive coke shipments have shrunk in volume as a result of competitive conditions in the East. By contrast, the bituminous coal market perhaps is a bit livelier. The railroads are reported to be laying in stocks of various steam coals. The recent uptrend in coal production in this district, in addition to a greater disposition of consumers to build stocks, has been interpreted by some observers as a contingent move in preparation for possible labor trouble on April 1. It is considered doubtful, however, that any unusual disturbances will occur in mine labor at that time. All fuel prices remain unchanged and likely will be carried through March at the present bases.

### Scrap

The leading consumer in this district has purchased approximately 10,000 tons of No. 1 heavy melting steel at a delivered price approximating \$13 a ton. This is the first scrap purchased from dealers by the leading interest since April, 1934. Brokers who have taken the business are experiencing difficulty in covering readily on round lots. Stray cars are reported to have been purchased at \$12.50, but dealer bids at less than \$12.75 generally are ignored by small yard dealers. In view of all conditions surrounding the foregoing transaction, including the accessibility of the delivery point, the easier freight rates applying and other details favorable to dealers, the price cannot be considered entirely representative of heavy melting steel in this district. More-

over, the purchase was made prior to the announcement of the gold clause decision, which has stimulated stronger sentiment in this market. No. 1 heavy melting steel thus is quotable only 25c. a ton lower this week at \$12.75 to \$13.25. Corresponding reductions have been made in other major grades.

## Buffalo Steel Rate Is Unchanged

**B**UFFALO, Feb. 19.—Steel output in this district is holding. Bethlehem's Lackawanna plant is running ten open-hearths; Republic Steel Corp'n. is operating five, including the 100-ton furnace; and Wickwire-Spencer is operating two. The Seneca sheet division of Bethlehem is running at 75 per cent of capacity.

Fabricated structural steel business is slow. A Buffalo fabricator is reported to be low bidder on a bridge at Struthers, Ohio, requiring 250 tons.

Pig iron producers report that foundry melt is at the highest rate in several years. Demand for shipments on old orders keeps up steadily and new business, while not large, is constant in volume.

The scrap market is off somewhat, having failed to hold the strength it accumulated in recent weeks. One large mill bought approximately 5000 tons at \$12 for the No. 1 heavy melting steel and \$11 for the No. 2 steel, but declined an additional 5000 tons at the same prices. Its offering price is now \$11.50 for No. 1 steel. Another mill whose purchase two or three weeks ago was recorded here is out of the market. One of the reasons for the first mill's disinclination to buy more at this time is the fact that it has acquired 25,000 tons for delivery by boat as soon as navigation opens.

## Scrap Prices Off Again at Detroit

**D**ETROIT, Feb. 19.—Scrap prices have slipped again, with melting steel, hydraulic bundles and other steel items down 25c. a ton. Dealers are of the opinion that the market may decline further in the immediate future, especially in view of the large amount of material coming out of the automobile industry.



# Chicago Rate Is Down 11 Points to 54 Per Cent



Demand From Motor Car Industry Shows Sharpest Drop—Railroad Equipment Shops Take More Steel—Melting Scrap Declines 25¢ a Ton

CHICAGO, Feb. 19.—Automobile manufacturers are largely responsible for an 11-point drop in the ingot rate of Chicago steel mills. Output now stands at 54 per cent and producers are watching developments very closely so that quick readjustments can be made on short notice. It should be noted that there is no let-down in use of sheet mill products, and sellers here have drawn the conclusion that troublesome sheet deliveries have formed a bottle neck in automobile assemblies and that this accounts for holding back shipments on other finished steel that goes into automobiles.

The miscellaneous trade remains fairly steady and some major consumers, such as car shops, are taking more steel. It is difficult to find a dissenter to the statement that a substantial volume of business will be done in the second quarter. It is pointed out that consumption of steel is well sustained, but it is also admitted that some stocks have been acquired in recent weeks.

The effects of the gold clause decision are still to be measured, but the notion is rather widespread that further efforts at inflation are in the offing and that possibly the turn of cash into commodities will create a demand which, as past experience has proved, will give no measure of actual consumption.

## Pig Iron

The average of daily shipments is ahead of the January rate and it now looks as though the February total will closely match that for January, which was the best month since 1930. New buying is dull because of the nearness of the new contracting period. A number of foundrymen are weighing the advisability of building inventories during the second quarter.

## Reinforcing Bars

This market is moving slowly. Inquiries are fairly numerous, but their aggregate volume is light. Fabricators are giving less attention to road slab work, for the rea-

son that new designs have cut the use of bars. Formerly from 10 to 12 tons of bars were used per mile, whereas now only 1½ to 3 tons are required. It is reported that the general contract has been closed on the Hammond, Ind., sewage plant, and signatures are being attached to contracts on the \$25,000,000 southwest sewage plant for the sanitary district. The 2000 tons for side dams at Zanesville, Ohio, will be readvertised.

## Cast Iron Pipe

February is running true to form, both inquiries and orders now being on the upgrade. Orders have been placed by Adams, Wis.; Duluth, Minn.; Griggsville, Ill., and by the State of Michigan for delivery to Kalamazoo. The winter is beginning to moderate and contractors visualize resumption of work within the next four to six weeks. A number of PWA projects that have been dormant through the winter are now being brought to life.

## Sheets

There is no let-up in specifications for sheet mill products that are used by automobile manufacturers. In fact it is reported here that sheet deliveries form the bottle neck of automobile production schedules. Insofar as some units in Chicago are concerned deliveries are still extending.

## Rails

The several railroads that have been named as potential buyers of rails have made no move to enter the market, and mills have not yet accumulated sufficient tonnage to start operations this far ahead of the time when deliveries must be made on such tonnage as is now on books. New bookings of accessories, though not so heavy as a week ago, nevertheless show improvement, which is normal at this time of year. Total orders are for about 800 tons.

## Wire Products

Demand for most products is creeping forward slowly, and the

production rate set several weeks ago to permit mills to build up stocks is now barely meeting shipments. One item, barbed wire, is less active, whereas woven wire fencing, nails and manufacturers' wire are moving faster. Trade in the Northwest is opening up slowly. Producers still feel confident that spring trade will be of satisfying proportions. However, there is beginning to be some concern as to the outlook for crops. By and large that area of the country which experienced drought last year has had a fair share of moisture, but there is still a deficiency which, unless made up in advance of spring rains, may prove detrimental to the winter wheat crop. Snows are entirely lacking in some of the mountain areas.

## Plates

Demand is decidedly better, though orders are still scattered and usually are small. Car builders are now distributing orders for material for the 1200 cars to be built for the Mexican National Railways. Railroads are ordering more material for car repairs, and municipal tank awards and inquiries total about 800 tons.

## Structural Material

Outstanding among awards is 2000 tons that will be used by General Motors Corp. for a Diesel-electric locomotive plant that will be erected near Chicago. A 1450-ton Illinois bridge has been awarded to the American Bridge Co. Other new business is light and fresh inquiries range from 500 tons each downward.

## Bars

The drop in steel mill operations here is particularly severe in bar departments. Most of the falling off is in orders from automobile plants and parts makers. Producers here are of the opinion that parts requiring bars are ahead of sheet department schedules, and therefore bar shipments for use in automobiles will be held back until assemblies can be better balanced as to sheet requirements.

## Scrap

Prices have turned weaker and quotations on heavy melting steel are off 25¢ a gross ton. Steel mill operations are lower and, since no blast furnaces have been taken out of service, there is less pressure for the steel mill grades. The railroads are picking the highest offers made on a few of the grades offered in lists and are holding the remaining tonnages. Automobile foundries are taking scrap freely and malleable scrap is growing scarcer.



# Decline in Steel Demand Checked in New York Area



Gold Clause Decision Expected to Have Favorable Effect on Market Sentiment—Oil and Beer Loom as Tin Plate Outlets

**N**EW YORK, Feb. 19.—Steel bookings still lack the buoyancy of earlier weeks of the year, but have lost no further ground. Hesitancy among steel buyers attributable to the gold clause case has now been removed by the Supreme Court's decision and it is possible that demand will take a new upturn.

No changes in prices for second quarter have thus far been filed with the steel code authority and on March 1 mills will be in a position to accept new contract business. The effective date on quantity extras for plates and shapes has again been postponed three months, this time until June 1 on shipments beginning July 1.

Demand for tin plate and terne plate is holding at a good level, although a few mills complain that shipping releases from the can companies have been coming out more slowly than might be wished. The rapid growth of the use of sealed metal containers for oil sold at gasoline filling stations is creating a large new market for cans. Both tin plate and long ternes are used for these cans, with the latter product commanding preference. The use of sealed pitch-lined tin cans for beer is said to have passed the experimental stage and promises to open up another large outlet for tin plate.

Railroad shops in this district are busier and are taking more material. The Bangor & Aroostook has placed several hundred tons of tie plates. The Virginian is in the market for 2200 tons of rails.

Bids will be taken March 14 on suspension spans and viaduct approaches for the Triborough bridge, New York, requiring 33,000 tons of structural steel.

Jobbers' prices on steel pipe in this district are still very much unsettled.

## Pig Iron

Consumers are purchasing only to cover imperative needs, and it is unlikely that the market will

expand to any degree until second quarter quotations become a certainty. There is no indication that any price change will be made. One large sale in the past seven-day period served to lift the week's total to 2450 tons, as compared to 1500 tons booked a week earlier and 1800 tons sold a fortnight ago.

## Reinforcing Steel

With miscellaneous lettings at a low ebb, local distributors are all trying to secure the 750 tons of bars for the Tri-Borough Bridge piers, on which the Frederick Snare Corp. is low bidder for the general contract. This award should be announced within the next week. Several bridges in New York State, requiring 320 tons, have been let to Carroll-McCreary Co., Inc., and 125 tons of bars for a railroad bridge at Pompton Plains, N. J., has been awarded to Igoe Brothers. Miscellaneous small-lot ordering continues to be in low volume, and the reinforcing steel business as a whole will probably lag considerably until spring, at which time weather conditions will be more conducive to highway and building construction.

## Scrap

This commodity is marking time and is probably due for another rise in the near future. This belief is based primarily on the fact that steel operations continue at a comparatively high level and are expected to stay near this level through April. Domestic mills in nearby areas have adopted an aloofness toward new commitments, but little or no weakness has resulted inasmuch as foreign buyers are just as anxious as ever to place tonnages on brokers' books. Several sizable export orders were consummated during the week, and steel continues to be accumulated in barges at prices ranging around \$9.50 and \$8 a ton for No. 1 and No. 2 respectively. The releases of dealers to brokers at these price levels are not as large as the latter would like, but

warmer weather is expected to accentuate the flow to a level comparable with late last year. Only routine orders are being delivered to domestic mills and foundries, mostly from Jersey City and interior Jersey points. However, most of the mills are at present operating on a slim scrap inventory, and it would seem that eastern Pennsylvania consumers must necessarily buy more actively in the near future.

## Large Concrete Bar Awards on Coast

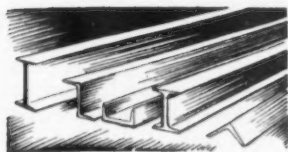
**S**AN FRANCISCO, Feb. 18.—Two major bookings are outstanding in a week which showed a marked increase in lettings and new projects. At Los Angeles the Metropolitan Water District of Southern California awarded four contracts aggregating 7030 tons of rail and billet reinforcing steel as follows: 2450 tons to Truscon Steel Co., 1780 tons to Concrete Engineering Co., 1800 tons to Soule Steel Co. and 1000 tons to West Virginia Rail Co.

The Southern Pacific Co. placed an order for 6000 tons of tie plates for 112 and 131-lb. rails with Columbia Steel Co. A gradual return of private construction may be indicated in lettings of 120 tons of structural steel for a plant for the Amalgamated Sugar Co. at Clarksburg, Cal., and 140 tons of shapes for a building for the American Potash & Chemical Co. at Trona, Cal. Palm Iron & Steel Co. and Ingalls Iron Works received the awards. Other lettings increased the week's totals to 8081 tons of bars, 1243 tons of shapes and 6521 tons of plates.

Bids will probably be taken in the very near future for the construction of the transmission line from the Boulder Dam power plant to the Los Angeles area. Approximately 15,000 tons of structural steel will be required for transmission towers. An award is expected to be made shortly by the Metropolitan Water District for 850 tons of structural steel for tunnel ribs. Star Iron & Steel Co. is reported as low bidder for a gantry crane at the Mare Island Navy Yard.

Although near-capacity production continues at the mills, no increase in price schedules is expected for the second quarter. However, the strength of scrap prices may result in some rise. Warehouse business has shown favorable gains during the past few weeks.

# Ingot Output Holds at 67 Per Cent at Cleveland



Sheet Mills Continue to Receive Reservations for Second Quarter Tonnage—1200 Tons of Concrete Bars Placed for Muskingum Project

CLEVELAND, Feb. 19.—Some tapering off in new demand for finished steel is still in evidence. However, ingot output in the Cleveland-Lorain territory has not declined, remaining at 67 per cent of capacity. One local producer this week put on an additional open-hearth furnace that had been shut down for repairs. This was offset by the taking off of an open-hearth by another Cleveland steel maker.

A rather comfortable situation exists in respect to sheets. Most mills are entirely or nearly filled up for the remainder of the quarter, and consumers are getting deliveries about as fast as needed. Some of the larger consumers outside of the automotive field, particularly refrigerator manufacturers anticipating a rush of motor car business, accumulated sizeable stocks several weeks ago. Mills continue to receive orders for considerable tonnage of sheets for the second quarter to be entered when books are opened March 1.

Concern is felt over the danger of labor troubles in the automotive field. Strikes have curtailed operations in several local metal-working plants engaged in automobile work. However, in one a settlement has been effected.

The Pere Marquette Railroad is inquiring for 200 tons of tie plates, and the Nickel Plate for a bridge requiring 150 tons of steel. Ohio fabricators have an inquiry for shelving for the Department of Commerce Building, Washington, requiring 300 tons of sheets.

Filing of steel and pig iron prices for the second quarter started Monday. No changes from present prices on any products are reported.

Steel-making scrap prices have declined.

## Pig Iron

The present \$18.50 Lake furnace price for foundry and malleable iron for the second quarter was reaffirmed in price schedules filed Monday by leading producers. Shipments are holding up to the January volume, with most of the iron going to automobile foundries,

and sales are fair. So far this month a leading producer has booked 15,000 tons, ranging from one lot of 1300 tons down to car lots.

## Sheets

The automotive industry and consumers in some other fields are showing much interest in getting second quarter orders entered when mill books open March 1, and have made requests for allotments of considerable tonnage for that delivery which will be formally entered on the books the first of the month. Miscellaneous consumers are still placing a fair volume of current business with mills that can take any additional orders for March shipment. While some producers are sold up for the quarter, some can take only certain grades, mostly hot-rolled material, and a few have tonnage available for March rolling. Heavy shipments are being specified by refrigerator, stove and washing machine tub manufacturers. Some mills can take no more enameling sheets for this quarter.

## Strip Steel

A spurt in buying has followed the recent lull in the demand. Some of the leading automobile parts makers placed fair-sized orders for both hot and cold-rolled strip during the week. Demand from other sources is slack. Mills can still take orders for delivery in two or three weeks.

## Iron Ore

Consumption of Lake Superior ore during January was 2,269,525 tons, an increase over December of 763,774 tons. This compares with 1,656,303 tons used in January, 1934. Furnace stocks Feb. 1 amounted to 27,004,376, and stocks at furnaces and Lake Erie docks on that date were approximately 900,000 tons less than on Feb. 1 last year, being 32,027,268 tons against 32,921,799 tons on the same date a year ago. Central district furnaces in January consumed 1,227,647 tons, a gain of 477,448 tons over December. Lake front furnaces consumed 1,037,135 tons, a gain of 286,378 tons over the previous month. All-rail furnaces

used 4743 tons, a decrease of 52 tons. The Lake Superior Iron Ore Association, in preparing its monthly tabulation of furnaces in blast, has eliminated 16 Eastern furnaces, five of which are now in operation but do not use Lake ore. On this basis 57 instead of 62 furnaces that used Lake ore were operating Jan. 1, and during the month there was an increase of 24 active stacks, making 81 furnaces that used Lake ore in blast on Feb. 1.

## Bolts, Nuts and Rivets

Specifications from the automotive industry are heavier this month than in January, but demand from other sources is rather slow and both consumers and jobbers still have stocks that were accumulated early last month at old prices. Prices for the second quarter are expected to be named about March 1.

## Bars, Plates and Shapes

Demand for bars, although not as heavy as during recent weeks, is holding up well. Forge shops and other consumers in the automotive field have not shown the anxiety to make extended commitments that has been displayed by consumers of sheets because there has not been the danger of bar deliveries becoming greatly extended. Deliveries of alloy steel bars have been slightly extended, but can be secured in three or four weeks. In the construction field a contract for a General Motors plant in the Chicago territory for building Diesel engine-powered locomotives, requiring 1500 tons or more of steel, has been awarded to a Cleveland builder. An industrial building in Troy, Ohio, requiring 330 tons, has been placed.

## Reinforcing Bars

An award of 1200 tons of rail steel reinforcing bars for the Muskingum, Ohio, conservancy project has been made to two bidders. Bids for the remaining 1200 tons included in the last inquiry were rejected by the United States Engineers, Zanesville, Ohio, and this additional steel will be included in general contracts that are to be awarded.

## Scrap

Prices on steel-making and blast furnace grades have receded 25c. a ton. With a downward tendency in steel plant operations, both Cleveland and Youngstown district consumers have held up shipments of steel-making scrap and these suspensions and an absence of new buying have caused the softness in prices. Dealers are still buying some No. 1 heavy melting steel scrap to fill outstanding orders with Youngstown district mills.



# Philadelphia Mart Less Active; With Output at 36 Per Cent



Railroad Purchases Likely if Car Loadings Continue to Rise—Pig Iron Buying Ahead of January—Scrap Prices Nominally Lower

**P**HILADELPHIA, Feb. 19. — Most sellers report a slight recession in general business, but the Supreme Court decision has so helped business sentiment that the trade is looking forward to a slight upward trend in general steel demand over the next month. The aggregate melting activity of district mills is unaltered from the previous week, the rate being close to 36 per cent of potential capacity. Unless the railroads throw off their buying inertia, there is not much likelihood of this rate increasing significantly in the immediate future.

Several of the smaller district mills are operating at about 25 to 30 per cent, and this low comparative rate is a direct result of the protracted consumer disinterest in blue-annealed sheets and light plates. At Sparrows Point the tin plate mills and spring wire departments are operating near capacity. The Pencoyd mill has scheduled both structural mills and four open-hearths for the remainder of the week.

Although demand for structural steel and bars will probably lag for at least another six weeks, a limited amount of railroad buying may shortly appear. If car loadings continue to improve they will soon be at the highest level since 1931. The increased burden on carriers would thus necessitate the inauguration of repair and construction programs.

## Pig Iron

Furnace representatives are currently receiving orders for substantially larger tonnages than in January. However, the total volume of bookings involved is still far from a satisfactory level. District mills are using more scrap in their melts and demand for basic iron is less than that indicated by a 36 per cent open-hearth operation. Foundries are melting in slightly heavier volume, but their schedules have not shown the same tendency to rise as has activity in other industrial lines.

## Sheets and Strip

There is a small routine demand for cold-rolled strip, and bookings of blue-annealed sheets remain at a low level. Automobile sheets continue in fair demand. The local autobody stamping plants are having difficulty in securing delivery on new orders for wide material before early April.

## Bars, Plates and Shapes

The inactivity of the building trades is reflected in poor bar and structural steel demand. Only about 1200 tons of reinforcing bars are pending in this territory. About 800 tons for prison buildings at Reidsville, Ga., has been awarded to Kalman Steel Corp., and the same company will furnish 120 tons for a Pennsylvania bridge. The contract for 130 tons for a highway in Montgomery County, Pa., has been divided between Kalman Steel Corp. and Consolidated Expanded Metals Co. The Belmont Iron Works will supply 115 tons of structural shapes for a Sylvania Corp. building at Fredericksburg, Va., and the McClintic-Marshall Corp. was awarded 100 tons for a subway station on the Philadelphia-Camden bridge approach. Otherwise the structural market is inactive, with no new tonnage projects coming up for bidding.

## Imports

The following iron and steel imports were received here last week: 3956 tons of pig iron from the Netherlands; 172 tons of the same product from British India; 50 tons of ferromanganese and 6 tons of manganese ore from England, and 43 tons of steel bars, 42 tons of steel tubes, 2 tons of steel billets and 1 ton of steel forgings from Sweden.

## Scrap

The continued and widespread mill disinterest in new scrap commitments has resulted in some market weakness. Brokers and dealers are willing to take orders for No. 1

steel at about \$11.50 a ton and that quotation is justified even though entirely nominal. No. 2 steel is also nominally quotable at \$10 a ton. Continued purchases for export delivery serve as an outlet for both No. 1 and No. 2 at \$10.50 and \$9.50 a ton respectively, at Port Richmond. A Japanese boat is due to dock on Feb. 28, but a local broker may transfer a boat from another port at an earlier date in order to dispose of accumulations at Port Richmond. During the recent period of weakness, Bethlehem has succeeded in picking up some sizable lots at favorable prices directly from dealers. The Phoenixville melter has dropped its stove plate price to \$7.50 in the Philadelphia area, but little or no tonnage is coming out. This same grade is being delivered at Harrisburg at \$9, and this latter price is considered representative of eastern Pennsylvania.

## Bids to Be Asked on Large Dam at St. Louis

**S**T. LOUIS, Feb. 19.—The United States Engineer's Office at St. Louis announces that bids will be asked March 1 (due about April 1) on dam No. 26 at Alton, Ill., 23 miles upstream from here. Approximately 6000 tons of structural steel, 1800 tons of reinforcing bars, 230,000 sq. ft. of steel sheet piling and 700 tons of miscellaneous metals will be required.

The award of 2100 tons of reinforcing bars for the Cahokia Creek diversion canal at East St. Louis, a PWA project, has been given to the Laclede Steel Co. and the Missouri Rolling Mills Corp.

St. Louis will take bids March 6 on a high school at Kingshighway and Arsenal to cost \$1,000,000 and to be of reinforced concrete construction. Estimates of the required tonnage of reinforcing are not yet available.

The scrap market is very dull. There has been no new buying, and offerings from outside points are heavier. Dealers are covering all short sales, feeling that the market will improve in a few weeks. Selected heavy steel, rails for rolling and cast iron car wheels are 25c. a ton lower, and No. 2 railroad wrought is 75c. off.

Shipments of pig iron continue heavy, and sales are numerous but small. The agricultural implement interests in the Moline section are extremely busy and the stove makers are beginning to show renewed vigor. Jobbing foundries in and around St. Louis report increased business.

BARS, PLATES, SHAPES, ETC.	
Iron	
Pittsburgh	
Chicago	
Gary	
Duluth	
Detroit	
Cleveland	
Buffalo	
Philadelphia	
New York	
Birmingham	
cars dock	
cars dock	
(For 1935)	
Pittsburgh	
Chicago	
Gary	
Duluth	
Detroit	
Cleveland	
Buffalo	
Philadelphia	
New York	
Birmingham	
cars dock	
cars dock	
Billet	
straight lengths	
Pittsburgh	
Chicago	
Gary	
Duluth	
Detroit	
Cleveland	
Youngstown	
Buffalo	
Birmingham	
cars dock	
cars dock	
Rail	
straight lengths	
Pittsburgh	
Chicago	
Gary	
Duluth	
Detroit	
Cleveland	
Youngstown	
Buffalo	
Birmingham	
cars dock	
cars dock	
Old Finished	
Pittsburgh	
Chicago	
Gary	
Duluth	
Detroit	
Cleveland	
Youngstown	
Buffalo	
Birmingham	
cars dock	
cars dock	
In quantities	
Fence a	
Angle	
Pittsburgh	
Chicago	
Gary	
Duluth	
Cleveland	
Youngstown	
Buffalo	
Birmingham	
cars dock	
cars dock	
New York	
Philadelphia	
Birmingham	
cars dock	
cars dock	
Bought iron plat	
Fl	
Pittsburgh	
Chicago	
Cleveland	
Buffalo	
Bethlehem	
New York	
Birmingham	
cars dock	
cars dock	
Struct	
Pittsburgh	
Chicago	
Cleveland	
Buffalo	
Bethlehem	
New York	
Birmingham	
cars dock	
cars dock	



# Prices of Finished Steel and Iron Products

## BARS, PLATES, SHAPES

### Iron and Steel Bars

Soft Steel	Base per Lb.
Pittsburgh	1.80c.
Chicago	1.85c.
Gary	1.85c.
Duluth	1.95c.
Detroit	1.95c.
Cleveland	1.85c.
Buffalo	1.90c.
Philadelphia	2.09c.
New York	2.13c.
Birmingham	1.95c.
cars dock Gulf ports	2.30c.
cars dock Pacific ports	2.35c.

### Rail Steel

(For merchant trade)

Pittsburgh	1.70c.
Chicago	1.75c.
Gary	1.75c.
Moline, Ill.	1.75c.
Cleveland	1.75c.
Buffalo	1.80c.
Birmingham	1.85c.
cars dock Gulf ports	2.10c.
cars dock Pacific ports	2.25c.

### Billet Steel Reinforcing

Slight lengths as quoted by distributors	2.05c.
Pittsburgh	2.10c.
Chicago	2.10c.
Gary	2.10c.
Detroit	2.10c.
Cleveland	2.10c.
Youngstown	2.10c.
Buffalo	2.10c.
Birmingham	2.10c.
cars dock Gulf ports	2.45c.
cars dock Pacific ports	2.45c.

### Rail Steel Reinforcing

Slight lengths as quoted by distributors	1.90c.
Pittsburgh	1.90c.
Chicago	1.95c.
Gary	1.95c.
Cleveland	1.95c.
Youngstown	1.95c.
Buffalo	1.95c.
Birmingham	1.95c.
cars dock Gulf ports	2.30c.
cars dock Pacific ports	2.30c.

### Iron

Chicago	1.80c.
Terre Haute, Ind.	1.75c.
Louisville, Ky.	2.10c.
Danville, Pa.	1.80c.
Berwick, Pa.	1.70c.

### Old Finished Bars and Shafting\*

	Base per Lb.
Pa. Pittsburgh	2.10c
Pa. Chicago	2.15c
Pa. Gary	2.15c
Pa. Cleveland	2.15c
Pa. Buffalo	2.20c
Pa. Detroit	2.30c
Pa. eastern Michigan	2.35c

\*In quantities of 10,000 to 19,000 lb.

\*In quantities of 10,000 to 19,000 lb.

### Fence and Sign Posts

Angle Line Posts	Base per Net Ton
Pittsburgh	\$50.00
Chicago	50.00
Duluth	51.00
Cleveland	50.00
Birmingham	53.00
Houston, Orange, Beaumont,	59.00
Mobile	59.00
New Orleans, Lake Charles,	59.00
Corpus Christi	59.00
cars dock Pacific ports	63.00

### Plates

	Base per Lb.
Feb. Pittsburgh	1.80c.
Feb. Chicago	1.85c.
Feb. Gary	1.85c.
Feb. Cleveland	1.85c.
Feb. Coatesville	1.90c.
Feb. Sparrows Point	1.90c.
Feb. Philadelphia	1.95c.
Feb. New York	2.08c.
Feb. Birmingham	1.95c.
Feb. cars dock Gulf ports	2.20c.
Feb. cars dock Pacific ports	2.35c.
Brought iron plates, f.o.b. P'gh.	3.00c.

### Floor Plates

Pittsburgh	3.35c.
Chicago	3.40c.
Coatesville	3.45c.
cars dock Gulf ports	3.75c.
cars dock Pacific ports	3.90c.

### Structural Shapes

	Base per Lb.
ah. Pittsburgh	1.80c.
ah. Chicago	1.85c.
ah. Cleveland	1.885c.
ah. Buffalo	1.90c.
ah. Bethlehem	1.90c.
ah. Philadelphia	2.005c.
ah. New York	2.0325c.
ah. Birmingham (standard)	1.95c.
ah. cars dock Gulf ports	2.20c.
ah. cars dock Pacific ports	2.35c.

## Steel Sheet Piling

	Base per Lb.
F.o.b. Pittsburgh .....	2.15c.
F.o.b. Chicago .....	2.25c.
F.o.b. Buffalo .....	2.25c.
F.o.b. cars dock Gulf ports .....	2.60c.
F.o.b. cars dock Pacific ports.....	2.60c.

## SHEETS, STRIP, TIN PLATE

### TERNE PLATE

#### Sheets

Hot Rolled	Base per Lb.
No. 10, f.o.b. Pittsburgh	1.85c.
No. 10, f.o.b. Gary	1.95c.
No. 10, del'd Detroit	2.05c.
No. 10, del'd Phila.	2.14c.
No. 10, f.o.b. Birmingham	2.00c.
No. 10, f.o.b. dock cars Pacific ports	2.40c.

#### Hot-Rolled Annealed

No. 24, f.o.b. Pittsburgh	2.40c.
No. 24, f.o.b. Gary	2.50c.
No. 24, del'd Detroit	2.60c.
No. 24, del'd Phila.	2.69c.
No. 24, f.o.b. Birmingham	2.55c.
No. 24, f.o.b. dock cars Pacific ports	3.05c.
No. 24, wrought iron, Pittsburgh	4.30c.

#### Heavy Cold-Rolled

No. 10 gage, f.o.b. Pittsburgh	2.50c.
No. 10 gage, f.o.b. Gary	2.60c.
No. 10 gage, del'd Detroit	2.70c.
No. 10 gage, del'd Phila.	2.79c.
No. 10 gage, f.o.b. Birmingham	2.50c.
No. 10 gage, f.o.b. dock cars Pacific ports	3.10c.

#### Light Cold-Rolled

No. 20 gage, f.o.b. Pittsburgh	2.95c.
No. 20 gage, f.o.b. Gary	3.05c.
No. 20 gage, del'd Detroit	3.15c.
No. 20 gage, del'd Phila.	3.24c.
No. 20 gage, f.o.b. Birmingham	3.10c.
No. 20 gage, f.o.b. dock cars Pacific ports	3.50c.

#### Galvanized Sheets

No. 24, f.o.b. Pittsburgh	3.10c.
No. 24, f.o.b. Gary	3.20c.
No. 24, del'd Phila.	3.39c.
No. 24, f.o.b. Birmingham	3.25c.
No. 24, f.o.b. dock cars Pacific ports	3.70c.
No. 24, wrought iron, Pittsburgh	4.95c.

#### Long Termes

No. 24, unassorted 8-lb. coating	3.40c.
f.o.b. Pittsburgh	3.40c.
f.o.b. cars dock Pacific ports	4.10c.

#### Vitreous Enameling Stock

No. 20, f.o.b. Pittsburgh	3.10c.
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#### Tin Mill Black Plate

No. 28, f.o.b. Pittsburgh	2.75c.
No. 28, Gary	2.85c.
No. 28, cars dock, Pacific Coast	3.35c.

#### Tin Plate

	Per Base Box
Standard cokes, f.o.b. P'gh district mill	\$5.25
Standard cokes, f.o.b. Gary	5.35
Standard cokes, f.o.b. cars dock Pacific ports	5.90

#### Terne Plate

(F.o.b. Pittsburgh)	(Per Package, 20 x 28 in.)
8-lb. coating I.C.	\$10.00
15-lb. coating I.C.	12.00
20-lb. coating I.C.	13.00
25-lb. coating I.C.	14.00
30-lb. coating I.C.	15.25
40-lb. coating I.C.	17.50

#### Hot-Rolled Hoops, Bands, Strips and Flats under 1/4 in.

Base per Lb.	
All widths up to 24 in., P'gh.....	1.85
All widths up to 24 in., Chicago....	1.95
All widths up to 24 in., del'd De- troit .....	2.05
All widths up to 24 in., Birmingham	2.00
Cooperage stock, Pittsburgh .....	2.10
Cooperage stock, Chicago .....	2.20

#### Cold-Rolled Strips

	Base per L
F.o.b. Pittsburgh .....	2.60
F.o.b. Cleveland .....	2.60
Del'd Chicago .....	2.88
F.o.b. Worcester .....	2.80

#### Fender Stock

No. 14, Pittsburgh or Cleveland	2.90c.
No. 14, Worcester	3.30c.
No. 20, Pittsburgh or Cleveland	3.30c.
No. 20, Worcester	3.70c.

#### Hot-Rolled Rail Steel Strips

Base per L	
F.o.b. Pittsburgh .....	1.70
F.o.b. Chicago .....	1.75
F.o.b. Birmingham .....	1.85

## WIRE PRODUCTS

(Carload lots, f.o.b. Pittsburgh and Cleveland.)

To Manufacturing Trade	Per Lb.
Bright wire	2.30c.
Springs wire	2.90c.

Chicago prices on products sold to the manufacturing trade are \$1 a ton above Pittsburgh or Cleveland. Worcester and Duluth prices are \$2 a ton above, Birmingham \$3 above, and Pacific Coast prices \$9 a ton above Pittsburgh or Cleveland.

#### To Jobbing Trade

Qualified jobbers are entitled to a reduction of 20c. a 100 lb. from the base price on carload shipments to stock, and of 10c. a 100 lb. on less-carload shipments to stock.

	Base per Keg
Standard wire nails .....	\$2.80
Smooth coated nails .....	2.60
Galvanized nails:	
15 gage and coarser .....	4.60
16 gage and finer .....	5.10

	Base per 100 Lb
Annealed fence wire.....	\$2.45
Galvanized fence wire .....	2.80
Polished staples .....	3.30
Galvanized staples .....	3.55
Barbed wire, galvanized .....	3.00
Woven wire fence, base column.....	63.00

Chicago and Anderson, Ind., mill prices are \$1 a ton over Pittsburgh base (on all products except woven wire fence, for which the Chicago price is \$2 above Pittsburgh); Duluth, Minn., and Worcester, Mass., mill prices are \$2 a ton over Pittsburgh (except for woven wire fences at Duluth which are \$3 over Pittsburgh), and Birmingham mill prices are \$3 a ton over Pittsburgh.

On wire nails, barbed wire, staples and fence wire, prices at Houston, Galveston and Corpus Christi, Tex., New Orleans, Lake Charles, La., and Mobile, Ala., are \$6 a ton over Pittsburgh, while Pacific Coast prices are \$8 over Pittsburgh. Exception: on fence wire Pacific Coast prices are \$11 a ton above Pittsburgh. On staples and barbed wire, prices of \$6 a ton above Pittsburgh are also quoted at Beaumont and Orange, Tex.

## Wire Hoops, Twisted or Welded

	<i>Off List</i>
F.o.b. Pittsburgh .....	.35 and 2½% off
F.o.b. Chicago .....	.35 off

## STEEL AND WROUGHT PIPE AND TUBING

### Welded Pipe

### Base Discounts, f.o.b. Pittsburgh District and Lorain, Ohio, Mills

F.o.b. Pittsburgh only on wrought iron pipe.

Inches	Steel	Wrought Iron
1/2	Black Galv. 55	Black Galv. 55
3/4	Black Galv. 55	Black Galv. 55
1	Black Galv. 55	Black Galv. 55
1 1/4	Black Galv. 55	Black Galv. 55
1 1/2	Black Galv. 55	Black Galv. 55
2	Black Galv. 55	Black Galv. 55
2 1/2	Black Galv. 55	Black Galv. 55
3	Black Galv. 55	Black Galv. 55
3 1/2	Black Galv. 55	Black Galv. 55
4	Black Galv. 55	Black Galv. 55
4 1/2	Black Galv. 55	Black Galv. 55
5	Black Galv. 55	Black Galv. 55
5 1/2	Black Galv. 55	Black Galv. 55
6	Black Galv. 55	Black Galv. 55
6 1/2	Black Galv. 55	Black Galv. 55
7	Black Galv. 55	Black Galv. 55
7 1/2	Black Galv. 55	Black Galv. 55
8	Black Galv. 55	Black Galv. 55
8 1/2	Black Galv. 55	Black Galv. 55
9	Black Galv. 55	Black Galv. 55
9 1/2	Black Galv. 55	Black Galv. 55
10	Black Galv. 55	Black Galv. 55
10 1/2	Black Galv. 55	Black Galv. 55
11	Black Galv. 55	Black Galv. 55
11 1/2	Black Galv. 55	Black Galv. 55
12	Black Galv. 55	Black Galv. 55
12 1/2	Black Galv. 55	Black Galv. 55
13	Black Galv. 55	Black Galv. 55
13 1/2	Black Galv. 55	Black Galv. 55
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15 1/2	Black Galv. 55	Black Galv. 55
16	Black Galv. 55	Black Galv. 55
16 1/2	Black Galv. 55	Black Galv. 55
17	Black Galv. 55	Black Galv. 55
17 1/2	Black Galv. 55	Black Galv. 55
18	Black Galv. 55	Black Galv. 55
18 1/2	Black Galv. 55	Black Galv. 55
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41 1/2	Black Galv. 55	Black Galv. 55
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42 1/2	Black Galv. 55	Black Galv. 55
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46 1/2	Black Galv. 55	Black Galv. 55
47	Black Galv. 55	Black Galv. 55
47 1/2	Black Galv. 55	Black Galv. 55
48	Black Galv. 55	Black Galv. 55
48 1/2	Black Galv. 55	Black Galv. 55
49	Black Galv. 55	Black Galv. 55
49 1/2	Black Galv. 55	Black Galv. 55
50	Black Galv. 55	Black Galv. 55

Butt Weld, extra strong, plain ends							
1/8	.....	48 1/2	33 1/2	1/8	.....	+13	+45
1/4	to 3/8	51	38	1/4	& %	+2 1/2	+34
1/2	.....	56 1/2	47 1/2	1/2	.....	32 1/2	17
3/4	.....	61	52	3/4	.....	37 1/2	22
1	to 3	63	55	1	to 2	43 1/2	29

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# BOLTS, NUTS, RIVETS AND SET SCREWS

**Bolts and Nuts**  
(F.o.b. Pittsburgh, Cleveland, Birmingham or Chicago)

Per Cent Off List	
Machine bolts	70, 10 and 10
Carriage bolts	70, 10 and 10
Lag bolts	70, 10 and 10
Flange bolts, Nos. 1, 2, 3 and 7	70, 10 and 10
Hot-pressed nuts, blank or tapped, square	70, 10 and 10
Hot-pressed nuts, blank or tapped, hexagonal	70, 10 and 10
C.p.c. and t. square or hex. nuts, blank or tapped	70, 10 and 10
Semi-finished hexagon nuts, U.S.S. all sizes	70, 10 and 10
Semi-finished hexagon nuts, S.A.E. 1/4 in. to 1 1/16 in. diameter	70, 10 and 10
1/2 in. to 1 in. diameter	70, 10 and 10
Larger than 1 in. diameter	70, 10 and 10
Store bolts in packages, Pittsburgh	75
Store bolts in packages, Cleveland	75
Store bolts in bulk, Pittsburgh	83
Store bolts in bulk, Cleveland	83
Store bolts in bulk, Birmingham	83
Tire bolts	60 and 10

Large Rivets (1/2-in. and larger)	
F.o.b. Pittsburgh or Cleveland	Base per 100 Lb. \$2.90
F.o.b. Chicago	3.00
F.o.b. Birmingham	3.05

Small Rivets (7/16-in. and smaller)	
F.o.b. Pittsburgh	Per Cent Off List 70 and 5
F.o.b. Cleveland	70 and 5
F.o.b. Chicago and Birmingham	70 and 5

**Cap and Set Screws**  
(Freight allowed up to but not exceeding 65c. per 100 lb. on lots of 200 lb. or more)

Per Cent Off List	
Milled cap screws, 1 in. dia. and smaller	80, 10 and 10
Milled standard set screws, case hardened, 1 in. dia. and smaller	75
Milled headless set screws, cut thread 1/4 in. and smaller	75
Unset hex. head cap screws, U.S.S. or S.A.E. thread, 1 in. dia. and smaller	85
Unset set screws, cut and oval point	75 and 10 to 80
Milled studs	65 to 65 and 10

# Alloy and Stainless Steel

**Alloy Steel Ingots**  
(F.o.b. Pittsburgh, Chicago, Canton, Massillon, Buffalo, Bethlehem, Uncropped) \$40 per gross ton

**Alloy Steel Blooms, Billets and Slabs**  
(F.o.b. Pittsburgh, Chicago, Canton, Massillon, Buffalo, Bethlehem, Uncropped) \$40 per gross ton

**Alloy Steel Bars**  
(F.o.b. Pittsburgh, Chicago, Canton, Massillon, Buffalo, Bethlehem, Uncropped) \$40 per gross ton

**Alloy Steel Pipes**  
(F.o.b. Pittsburgh, Chicago, Canton, Massillon, Buffalo, Bethlehem, Uncropped) \$40 per gross ton

**Alloy Steel Plates**  
(F.o.b. Pittsburgh, Chicago, Canton, Massillon, Buffalo, Bethlehem, Uncropped) \$40 per gross ton

**Alloy Steel Wire**  
(F.o.b. Pittsburgh, Chicago, Canton, Massillon, Buffalo, Bethlehem, Uncropped) \$40 per gross ton

**Alloy Steel Castings**  
(F.o.b. Pittsburgh, Chicago, Canton, Massillon, Buffalo, Bethlehem, Uncropped) \$40 per gross ton

**Alloy Steel Forgings**  
(F.o.b. Pittsburgh, Chicago, Canton, Massillon, Buffalo, Bethlehem, Uncropped) \$40 per gross ton

**Alloy Steel Sheet Piles**  
(F.o.b. Pittsburgh, Chicago, Canton, Massillon, Buffalo, Bethlehem, Uncropped) \$40 per gross ton

**Alloy Steel Structural Shapes**  
(F.o.b. Pittsburgh, Chicago, Canton, Massillon, Buffalo, Bethlehem, Uncropped) \$40 per gross ton

**Alloy Steel Welded Pipe**  
(F.o.b. Pittsburgh, Chicago, Canton, Massillon, Buffalo, Bethlehem, Uncropped) \$40 per gross ton

**Alloy Steel Castings**  
(F.o.b. Pittsburgh, Chicago, Canton, Massillon, Buffalo, Bethlehem, Uncropped) \$40 per gross ton

**Alloy Steel Forgings**  
(F.o.b. Pittsburgh, Chicago, Canton, Massillon, Buffalo, Bethlehem, Uncropped) \$40 per gross ton

**Alloy Steel Sheet Piles**  
(F.o.b. Pittsburgh, Chicago, Canton, Massillon, Buffalo, Bethlehem, Uncropped) \$40 per gross ton

**Alloy Steel Structural Shapes**  
(F.o.b. Pittsburgh, Chicago, Canton, Massillon, Buffalo, Bethlehem, Uncropped) \$40 per gross ton

**Alloy Steel Welded Pipe**  
(F.o.b. Pittsburgh, Chicago, Canton, Massillon, Buffalo, Bethlehem, Uncropped) \$40 per gross ton

**Alloy Steel Castings**  
(F.o.b. Pittsburgh, Chicago, Canton, Massillon, Buffalo, Bethlehem, Uncropped) \$40 per gross ton

**Alloy Steel Forgings**  
(F.o.b. Pittsburgh, Chicago, Canton, Massillon, Buffalo, Bethlehem, Uncropped) \$40 per gross ton

**Alloy Steel Sheet Piles**  
(F.o.b. Pittsburgh, Chicago, Canton, Massillon, Buffalo, Bethlehem, Uncropped) \$40 per gross ton

**Alloy Steel Structural Shapes**  
(F.o.b. Pittsburgh, Chicago, Canton, Massillon, Buffalo, Bethlehem, Uncropped) \$40 per gross ton

**Alloy Steel Welded Pipe**  
(F.o.b. Pittsburgh, Chicago, Canton, Massillon, Buffalo, Bethlehem, Uncropped) \$40 per gross ton

**Alloy Steel Castings**  
(F.o.b. Pittsburgh, Chicago, Canton, Massillon, Buffalo, Bethlehem, Uncropped) \$40 per gross ton

**Alloy Steel Forgings**  
(F.o.b. Pittsburgh, Chicago, Canton, Massillon, Buffalo, Bethlehem, Uncropped) \$40 per gross ton

**Alloy Steel Sheet Piles**  
(F.o.b. Pittsburgh, Chicago, Canton, Massillon, Buffalo, Bethlehem, Uncropped) \$40 per gross ton

**Alloy Steel Structural Shapes**  
(F.o.b. Pittsburgh, Chicago, Canton, Massillon, Buffalo, Bethlehem, Uncropped) \$40 per gross ton

**Alloy Steel Welded Pipe**  
(F.o.b. Pittsburgh, Chicago, Canton, Massillon, Buffalo, Bethlehem, Uncropped) \$40 per gross ton

**Alloy Steel Castings**  
(F.o.b. Pittsburgh, Chicago, Canton, Massillon, Buffalo, Bethlehem, Uncropped) \$40 per gross ton

**Alloy Steel Forgings**  
(F.o.b. Pittsburgh, Chicago, Canton, Massillon, Buffalo, Bethlehem, Uncropped) \$40 per gross ton

**Alloy Steel Sheet Piles**  
(F.o.b. Pittsburgh, Chicago, Canton, Massillon, Buffalo, Bethlehem, Uncropped) \$40 per gross ton

**Alloy Steel Structural Shapes**  
(F.o.b. Pittsburgh, Chicago, Canton, Massillon, Buffalo, Bethlehem, Uncropped) \$40 per gross ton

# Raw and Semi-Finished Steel

## Carbon Steel Re-rolling Ingots

(F.o.b. Pittsburgh, Chicago, Gary, Cleveland, Youngstown, Buffalo, Birmingham, Uncropped) \$29 per gross ton

## Carbon Steel Forging Ingots

(F.o.b. Pittsburgh, Chicago, Gary, Cleveland, Youngstown, Buffalo, Birmingham, Uncropped) \$31 per gross ton

## Billets, Blooms and Slabs

(F.o.b. Pittsburgh, Chicago, Gary, Cleveland, Youngstown, Buffalo, Birmingham, Uncropped) \$27.00 per gross ton

## Re-rolling

(F.o.b. Pittsburgh, Chicago, Gary, Cleveland, Youngstown, Buffalo, Birmingham, Uncropped) \$27.00 per gross ton

## Forging quality

(F.o.b. Pittsburgh, Chicago, Gary, Cleveland, Youngstown, Buffalo, Birmingham, Uncropped) \$27.00 per gross ton

## Delivered Detroit

(F.o.b. Pittsburgh, Chicago, Gary, Cleveland, Youngstown, Buffalo, Birmingham, Uncropped) \$30.00 per gross ton

## Forging Billets Only F.o.b. Duluth

(F.o.b. Pittsburgh, Chicago, Gary, Cleveland, Youngstown, Buffalo, Birmingham, Uncropped) \$29.00 per gross ton

## Re-rolling

(F.o.b. Pittsburgh, Chicago, Gary, Cleveland, Youngstown, Buffalo, Birmingham, Uncropped) \$29.00 per gross ton

## Forging

(F.o.b. Pittsburgh, Chicago, Gary, Cleveland, Youngstown, Buffalo, Birmingham, Uncropped) \$29.00 per gross ton

## Sheet Bars

(F.o.b. Pittsburgh, Chicago, Gary, Cleveland, Youngstown, Buffalo, Birmingham, Uncropped) \$28.00 per gross ton

## Open-hearth or Bessemer

(F.o.b. Pittsburgh, Chicago, Gary, Cleveland, Youngstown, Buffalo, Birmingham, Uncropped) \$28.00 per gross ton

## Skelp

(F.o.b. Pittsburgh, Chicago, Youngstown, Buffalo, Coatesville, Pa., Sparrows Point, Md.)

Per Lb.	
Grooved	1.70c.
Universal	1.70c.
Sheared	1.70c.

## Tube Rounds

(F.o.b. Pittsburgh, Chicago, Gary, Cleveland, Youngstown, Buffalo, Birmingham, Uncropped) \$27.00 per gross ton

Base per Lb.	
F.o.b. Pittsburgh	1.80c.
F.o.b. Chicago	1.85c.
F.o.b. Cleveland	1.85c.
F.o.b. Buffalo	1.90c.
F.o.b. Birmingham	1.95c.

## Wire Rods

(F.o.b. Pittsburgh, Chicago, Gary, Cleveland, Youngstown, Buffalo, Birmingham, Uncropped) \$28.00 per gross ton

Per Gross Ton	
F.o.b. Pittsburgh	38.00
F.o.b. Cleveland	39.00
F.o.b. Chicago	39.00
F.o.b. Youngstown	39.00
F.o.b. Worcester, Mass.	40.00
F.o.b. Birmingham	41.00
F.o.b. San Francisco	47.00
F.o.b. Galveston	44.00

# Pig Iron and Ferroalloys

## PIG IRON

### PRICES PER GROSS TON AT BASING POINTS

Basing Points	No. 2 Fdry.	Malleable	Basic	Bessemer
Everett, Mass.	\$19.50	\$20.00	\$19.00	\$20.50
Bethlehem, Pa.	19.50	20.00	19.00	20.50
Birdsboro, Pa.	19.50	20.00	19.00	20.50
Swedeland, Pa.	19.50	20.00	19.00	20.50
Steelton, Pa.	19.50	20.00	19.00	20.50
Sparrows Point, Md.	18.50	18.50	18.00	19.00
Neville Island, Pa.	18.50	18.50	18.00	19.00
Sharpsville, Pa.	18.50	18.50	18.00	19.00
Youngstown	18.50	18.50	18.00	19.00
Buffalo	18.50	19.00	17.50	19.50
Erie, Pa.	18.50	18.50	18.00	19.00
Cleveland	18.50	18.50	18.00	19.00
Toledo, Ohio	18.50	18.50	18.00	19.00
Jackson, Ohio	20.25	20.25	19.75	20.25
Detroit	18.50	18.50	18.00	19.00
Hamilton, Ohio	18.50	18.50	18.00	19.00
Chicago	18.50	18.50	18.00	19.00
Granite City, Ill.	19.00	19.00	18.50	19.50
Duluth, Minn.	14.50	14.50	13.50	19.00
Birmingham	17.50	17.50	17.00	17.50
Provo, Utah	17.50	17.50	17.00	17.50

### DELIVERED PRICES PER GROSS TON AT CONSUMING CENTERS

	No. 2 Fdry.	Malleable	Basic	Bessemer
Boston Switching District	\$20.00	\$20.50	\$19.50	\$21.00
From Everett, Mass.	21.77	22.27	21.27	22.77
Brooklyn	20.89	21.39	20.39	21.89
From East. Pa. or Buffalo	20.26	20.76	19.76	21.26
Newark or Jersey City, N. J.	19.51	19.51	19.01	20.01
Philadelphia	19.76	19.76	19.26	20.26
From Eastern Pa.	20.50	20.50	19.50	20.50
Cincinnati	20.26	20.26	19.26	20.26
From Hamilton, Ohio	20.77	20.77	19.77	20.77
Canton, Ohio	20.55	20.55	19.55	20.55
From Cleveland and Youngstown	19.50	19.50	18.50	19.50
Columbus, Ohio	20.26	20.26	19.26	20.26
From Hamilton, Ohio	20.77	20.77	19.77	20.77
Mansfield, Ohio	20.55	20.55	19.55	20.55
From Cleveland and Toledo	19.50	19.50	18.50	19.50
Indianapolis	20.26	20.26	19.26	20.26
From Hamilton, Ohio	20.77	20.77	19.77	20.77
South Bend, Ind.	20.55	20.55	19.55	20.55
From Chicago	19.50	19.50	18.50	19.50
Milwaukee	20.26	20.26	19.26	20.26
From Chicago	20.77	20.77	19.77	20.77
St. Paul	20.55	20.55	19.55	20.55
From Duluth	19.50	19.50	18.50	19.50
Davenport, Iowa	20.26	20.26	19.26	20.26
From Chicago	20.77	20.77	19.77	20.77
Kansas City	21.04	21.04	20.04	21.04
From Granite City	20.26	20.26	19.26	20.26

Delivered prices on Southern iron for shipment to Northern points are 38c. a gross ton below delivered prices from the nearest Northern basing points.

## LOW PHOSPHORUS PIG IRON

Basing points: Birdsboro, Pa., Steelton, Pa., and Standish, N. Y. \$23.50

## GRAY FORGE PIG IRON

Valley furnace \$18.00  
Pittsburgh district furnace \$18.00

## CHARCOAL PIG IRON

Lake Superior furnace \$21.00

Delivered Chicago 24.04

Delivered Buffalo 24.28

## CANADA

### Pig Iron

Per gross ton:  
Delivered Toronto

No. 1 fdy., sil.	2.25 to 2.75
No. 2 fdy., sil.	1.75 to 2.75
Malleable	2.25

### Delivered Montreal

No. 1 fdy., sil.	2.25 to 2.75
No. 2 fdy., sil.	1.75 to 2.25
Malleable	2.25
Basic	2.25

# FERROALLOYS

## Ferromanganese

(F.o.b. New York, Philadelphia, Baltimore, Mobile or New Orleans)

Domestic, 80% (carload) \$18.00

## Spiegeleisen

Domestic, 19 to 21% \$18.00

## Electric Ferrosilicon

Per Gross Ton Delivered	
50% (carloads)	\$18.00
50% (ton lots)	18.50
75% (carloads)	19.00
75% (ton lots)	19.50

## Silvery Iron

(F.o.b. Jackson, Ohio, Furnace)

Per Gross Ton	
6%	\$22.75
7%	23.75
8%	24.75
9%	25.75
10%	26.75
11%	27.75

The lower all-rail delivered price for Jackson or Buffalo is quoted with base allowed. Base prices at Buffalo are \$1.50 a ton higher than at Jackson.

## Bessemer Ferrosilicon

(F.o.b. Jackson, Ohio, Furnace)

Per Gross Ton	
10%	\$27.75
11%	28.75
12%	29.75
13%	31.75

Manganese 1 1/2 to 3%, \$1 a ton additional. For each unit of manganese 3%, \$1 a ton additional. Phosphorus 0.75% or over, \$1 ton additional.

Base prices at Buffalo are \$1.50 a ton higher than at Jackson.

## Other Ferroalloys

Ferrotungsten, per lb. contained W. del., carloads \$1.35 to \$1.45

Ferrotungsten, less carloads, 1.45 to 1.55

Ferromanganese, 4 to 6% carbon and up, 65 to 70% Cr. per lb. contained Cr. delivered, in carloads \$1.10 to \$1.20

Ferromanganese, 2% carbon \$16.50c. to \$17.50c.

Ferromanganese, 1% carbon \$17.50c. to \$18.50c.

Ferromanganese, 0.10% carbon \$19.50c. to \$20.50c.

Ferromanganese, 0.06% carbon \$20.00c. to \$21.00c.

Ferrovandium, del., per lb. contained V. \$2.70 to \$2.80

Ferrocobalt, 15 to 18% Ti, 6 to 8% C. f.o.b. furnace carload and contract per net ton \$11.00 to \$12.00

Ferrophosphorus, electric, or blast furnace material, in carloads, 18% Rockdale, Tenn., base, per gross ton with \$2 unitage \$11.00 to \$12.00

Ferrophosphorus, electric, 24% f.o.b. Anniston, Ala., per gross ton with \$2.75 unitage \$11.00 to \$12.00

Ferromolybdenum, per lb. Mo., del. \$1.10 to \$1.20

Calcium molybdate, per lb. Mo., del. \$1.10 to \$1.20

Silico spiegel, per ton, f.o.b. furnace, car lots \$2.50 to \$3.00

2% carbon grade \$2.50 to \$3.00

1% carbon grade \$2.50 to \$3.00

Spot prices \$5 a ton



# Iron and Steel Scrap

## PITTSBURGH

Per gross ton delivered consumers' yards:	
No. 1 heavy melting steel	\$12.75 to \$13.25
No. 2 heavy melting steel	11.75 to 12.25
No. 2 railroad wrought	12.75 to 13.25
Scrap rails	14.00 to 14.50
Rolls 3 ft. and under	14.50 to 15.00
Compressed sheet steel	12.75 to 13.25
Hand bundled sheet steel	11.75 to 12.25
Hvy. steel axle turnings	10.50 to 11.00
Machine shop turnings	9.00 to 9.50
Short shov. turnings	9.00 to 9.50
Short mixed borings and turnings	6.75 to 7.25
Cast iron borings	6.75 to 7.25
Cast iron car wheels	12.75 to 13.25
Heavy breakable cast	12.25 to 12.75
No. 1 cast	13.50 to 14.00
Rolls	15.00 to 15.50
Roll, coil and leaf springs	15.00 to 15.50
Rolls steel wheels	15.00 to 15.50
Low phos. billet crops	15.00 to 15.50
Low phos. sheet bar crops	15.00 to 15.50
Low phos. plate scrap	14.00 to 14.50
Low phos. punchings	14.00 to 14.50
Steel car axles	15.00 to 15.50

## CLEVELAND

Per gross ton delivered consumers' yards:	
No. 1 heavy melting steel	\$10.75 to \$11.25
No. 2 heavy melting steel	10.25 to 10.75
Compressed sheet steel	10.00 to 10.50
Light bundled sheet stampings	9.00 to 9.50
Drop forge flashings	10.00 to 10.50
Machine shop turnings	8.00 to 8.50
Short shoveling turnings	8.00 to 8.50
No. 1 busheling	9.50 to 10.00
Steel axle turnings	9.50 to 10.00
Low phos. billet crops	14.50 to 15.00
Cast iron borings	7.75 to 8.25
Mixed borings and short turnings	7.75 to 8.25
No. 2 busheling	7.75 to 8.25
No. 1 cast	12.50 to 13.00
Railroad grate bars	7.00 to 7.50
Stove plate	8.00 to 8.50
Rolls under 3 ft.	15.00 to 15.50
Rolls for rolling	15.50 to 16.00
Railroad malleable	13.00 to 13.50
Cast iron car wheels	12.00

## BUFFALO

Per gross ton, f.o.b. Buffalo consumers' plants:	
No. 1 heavy melting steel	\$11.50 to \$12.00
No. 2 heavy melting steel	10.50 to 11.00
Scrap rails	12.00 to 12.50
New hydraulic, comp. sheets	10.50 to 11.00
Old hydraulic, comp. sheets	10.00 to 10.50
Drop forge flashings	10.50 to 11.00
No. 1 busheling	10.50 to 11.00
Hvy. steel axle turnings	8.00 to 8.50
Machine shop turnings	6.25
Knuckles and couplers	12.00 to 12.50
Coil and leaf springs	13.00 to 13.50
Rolls steel wheels	13.00 to 13.50
Low phos. billet crops	13.75 to 14.25
Short shov. steel turnings	7.25 to 7.50
Short mixed borings and turnings	7.25 to 7.50
Cast iron borings	7.25 to 7.50
No. 2 busheling	7.50 to 8.00
Steel car axles	13.50 to 14.00
Iron axles	13.50 to 14.00
No. 1 machinery cast	12.00 to 12.50
No. 1 cupola cast	12.00 to 12.50
Stove plate	10.00 to 10.50
Steel rails, 3 ft. and under	14.00 to 14.50
Cast iron car wheels	11.50 to 12.00
Industrial malleable	12.50 to 13.00
Railroad malleable	12.50 to 13.00
Chemical borings	8.50 to 9.00

## BOSTON

Dealers' buying prices per gross ton:	
*No. 1 heavy melting steel	\$9.00 to \$9.25
No. 1 heavy melting steel	7.00 to 7.25
Scrap T rails	7.75 to 8.00
No. 2 steel	6.25 to 6.50
No. 2 cast	6.00 to 6.25
Breakable cast	6.00 to 6.25
Machine shop turnings	2.75 to 3.25
Bundled skeleton, long	5.75 to 6.00
Forge flashings	5.75 to 6.00
Mixed borings and turnings	11.50 to 12.00
Shafting	11.50 to 12.00
Steel car axles	11.50 to 12.00
Cast iron borings, chemical	6.50 to 7.00
Stove plate	4.00 to 4.25
Per gross ton delivered consumers' yards:	
Textile cast	\$9.00 to \$9.50
No. 1 machinery cast	9.00 to 9.50
Stove plate	6.00 to 6.50
Railroad malleable	11.00 to 11.50

\* Delivered local army base.

## NEW YORK

Dealers' buying prices per gross ton:	
No. 1 heavy melting steel	\$8.50 to \$9.50
No. 2 heavy melting steel	7.50 to 8.00
Heavy breakable cast	6.75 to 7.25
No. 1 machinery cast	7.50 to 8.00
No. 2 cast	6.50 to 7.00
Stove plate	6.00 to 6.50
Steel car axles	12.50 to 13.00
No. 1 railroad wrought	7.50 to 8.00
No. 1 yard wrought, long	6.50 to 7.00
Spec. iron and steel pipe	4.50 to 5.00
Forge fire	5.50 to 6.00
Rolls for rolling	9.00 to 9.50
Short shoveling turnings	2.50 to 3.00
Machine shop turnings	2.50 to 3.00
Cast borings	3.50 to 3.75
No. 1 blast furnace	2.00 to 2.50
Cast borings (chemical)	11.00 to 11.50
Unprepared yard iron and steel	4.50 to 5.00
Per gross ton, delivered local foundries:	
No. 1 machinery cast	\$10.50
No. 1 hvy. cast (cupola size)	9.50
No. 2 cast	8.00

\* For direct car loading only.

† Loading on barge.

## BIRMINGHAM

Per gross ton delivered consumers' yards:	
Heavy melting steel	\$9.00 to \$9.50
Scrap steel rails	10.00 to 10.50
Short shoveling turnings	7.00
Stove plates	7.00
Steel axles	11.50
Iron axles	11.50
No. 1 railroad wrought	7.00
Rolls for rolling	12.50
No. 1 cast	9.50 to 10.00
Tramcar wheels	10.00
Cast iron borings, chem.	8.00

## ST. LOUIS

Per gross ton delivered consumers' yards:	
Selected heavy steel	\$9.00 to \$9.50
No. 1 heavy melting	8.50 to 9.00
No. 2 heavy melting	7.50 to 8.00
No. 1 locomotive tires	9.75 to 10.25
Misc. stand-sec. rails	10.00 to 10.50
Railroad springs	11.00 to 11.50
Bundled sheets	6.00 to 6.50
No. 2 railroad wrought	8.50 to 9.00
No. 1 busheling	5.00 to 5.50
Cast iron borings and shoveling turnings	4.00 to 4.50
Rolls for rolling	10.75 to 11.25
Machine shop turnings	4.00 to 4.50
Heavy turnings	5.50 to 6.00
Steel car axles	13.50 to 14.00
Railroad malleable	15.00 to 16.00
No. 1 railroad wrought	7.50 to 8.00
Steel rails less than 3 ft.	11.75 to 12.25
Steel angle bars	9.50 to 10.00
Cast iron car wheels	8.00 to 8.50
No. 1 machinery cast	9.00 to 9.50
Railroad malleable	10.00 to 10.50
No. 1 railroad cast	9.00 to 9.50
Stove plate	6.50 to 7.00
Agricult. malleable	8.50 to 9.00

## DETROIT

Dealers' buying prices per gross ton:	
Heavy melting steel	\$8.25 to \$8.75
Borings and short turnings	4.75 to 5.25

## ORES, FLUORSPAR, COKE, FUEL, REFRACTORIES

### Lake Superior Ores

Delivered Lower Lake Ports	
Per Gross Ton	
Old range, Bessemer, 51.50% iron	\$4.80
Old range, non-Bessemer, 51.50% iron	4.65
Mesabi, Bessemer, 51.50% iron	4.65
Mesabi, non-Bessemer, 51.50% iron	4.50
High phosphorus, 51.50% iron	4.40

### Foreign Ore

C.I.F. Philadelphia or Baltimore	
Per Unit	
Iron, low phos., copper free, 55 to 58% iron, dry Spanish or Algeria	9.50c.
Iron, low phos., Swedish, average 68 1/2% iron	9.50c.
Iron, basic or foundry, Swedish, aver. 65% iron	9c.
Iron, basic or foundry, Russian, aver. 65% iron	9c.
Manganese, Caucasian, washed 52% 48% iron	21c.
Manganese, African, Indian, 49-51%	21c.
Manganese, Brazilian, 46 to 48 1/2%	20c.

Per Net Ton Unit	
Tungsten, Chinese, wolframite, duty paid, delivered*	\$17.50 to \$18.50
Tungsten, domestic scheelite, delivered†	17.00

Per Gross Ton	
Chrome, 45%, Cr <sub>2</sub> O <sub>3</sub> , crude, c.i.f. Atlantic Seaboard	\$17.00
Chrome, 48%, Cr <sub>2</sub> O <sub>3</sub> , c.i.f. Atlantic Seaboard	20.00

\*Quotations nominal in absence of sales.

†Nominal; no supplies available.

### Fluorspar

Per Net Ton	
Domestic, washed gravel, 85-5, f.o.b. Kentucky and Illinois mines for all-rail shipment	\$15.50 to \$16.00
Same grade for Ohio River barge shipment for Kentucky and Illinois River landings	17.50
No. 2 lump, 85-5, f.o.b. Kentucky and Illinois mines	16.00
Foreign, 85% calcium fluoride, not over 5% silicon, c.i.f. Atlantic ports, duty paid	19.00
Domestic, No. 1 ground bulk, 95 to 98% calcium fluoride, not over 2 1/2% silicon, f.o.b. Illinois and Kentucky mines	30.00

### COKE, COAL AND FUEL OIL

Coke	
Per Net Ton	
Furnace, f.o.b. Connellsville Prompt	\$3.85
Foundry, f.o.b. Connellsville Prompt	\$4.60 to \$5.10
Foundry, by-product, Chicago ovens, for delivery outside switchings district	8.50
Foundry, by-product, delivered in Chicago switching district	9.25
Foundry, by-product, New England, delivered	11.00
Foundry, by-product, Newark or Jersey City, del'd	8.20 to 8.81
Foundry, by-product, Phila.	9.00

Long turnings	\$4.00 to \$4.50
No. 1 machinery cast	10.50 to 11.00
Automotive cast	10.75 to 11.25
Hydraulic, comp. sheets	8.25 to 8.75
Stove plate	6.50 to 7.00
New factory busheling	7.25 to 7.75
Old No. 2 busheling	4.25 to 4.75
Sheet clippings	6.00 to 6.50
Flashings	8.00 to 8.50
Low phos. plate scrap	8.75 to 9.25

## CANADA

Dealers' buying prices per gross ton:	
Toronto-Montreal	
Heavy melting steel	\$7.00 \$7.00
Rolls scrap	8.00 8.00
Machine shop turnings	3.00 3.00
Roller plate	4.50 4.50
Heavy axle turnings	4.50 4.00
Cast borings	4.00 3.50
Steel borings	2.00 2.00
Wrought pipe	3.50 3.50
Steel axles	7.00 8.00
Axles, wrought iron	7.00 8.00
No. 1 machinery cast	9.00 9.00
Stove plate	5.50 5.00
Standard car wheels	7.25 7.00
Malleable	6.75 7.00

Foundry, by-product, Cleveland, delivered	\$9.25
Foundry, Birmingham	6.00
Foundry, by-product, St. Louis, f.o.b. ovens	8.00
Foundry, by-product, del'd St. Louis	9.00

### Coal

Per Net Ton	
Mine run steam coal, f.o.b. W. Pa. mines	\$1.80 to \$2.05
Mine run coking coal, f.o.b. W. Pa. mines	2.05 to 2.25
Gas coal, 3/4-in., f.o.b. Pa. mines	2.25 to 2.55
Mine run gas coal, f.o.b. Pa. mines	2.05 to 2.45
Steam slack, f.o.b. W. Pa. mines	1.55 to 1.65
Gas slack, f.o.b. W. Pa. mines	1.90 to 2.10

### Fuel Oil

Per Gal. f.o.b. Bayonne, N. J.	
No. 3 distillate	4.00c.
No. 4 industrial	3.50c.
Per Gal. f.o.b. Baltimore	
No. 3 distillate	4.00c.
No. 4 industrial	3.50c.

Per Gal. del'd Chicago	
No. 3 industrial fuel oil	3.88c.
No. 5 industrial fuel oil	3.38c.

Per Gal. f.o.b. Cleveland	
No. 3 distillate	5.50c.
No. 4 industrial	5.25c.
No. 5 industrial	4.00c.

## REFRACTORIES

### Fire Clay Brick

Per 1000 f.o.b. Works	
High-heat Intermediate Duty Brick	
Pennsylvania	\$45.00
Maryland	45.00
New Jersey	55.00
Ohio	45.00
Kentucky	45.00
Missouri	45.00
Illinois	45.00
Ground fire clay, per ton	7.00

### Chrome Brick

Per Net Ton	
Standard size	\$45.00

### Silica Brick

Per 1000 f.o.b. Works	
Pennsylvania	\$45.00
Chicago	54.00
Birmingham	55.00
Silica clay, per ton	8.00

### Magnesite Brick

Per Net Ton	
Standard size, burned, f.o.b. Baltimore and Chester, Pa.	\$65.00
Unburned, f.o.b. Baltimore	55.00
Imported grain magnesite, f.o.b. Baltimore and Chester, Pa.	45.00
Domestic grain magnesite, f.o.b. Baltimore and Chester, Pa.	40.00
Domestic, f.o.b. Chewelah, Wash.	22.00



# Warehouse Prices for Steel Products

PITTSBURGH	
	Base per Lb.
Plates	3.15c.
Structural shapes	3.15c.
Soft steel bars and small shapes	2.90c.
Reinforcing steel bars	2.90c.
Cold-finished and screw stock:	
Rounds and hexagons	3.45c.
Squares and flats	3.45c.
Hoops and bands under 1/4 in.	3.20c.
Hot-rolled annealed sheets (No. 24), 25 or more bundles	3.30c.
Galv. sheets (No. 24), 25 or more bundles	3.35c.
Hot-rolled sheets (No. 10)	2.95c.
Galv. corrug. sheets (No. 28), per square (more than 3750 lb.)	\$3.69
Spikes, large	2.90c.
Track bolts, all sizes, per 100 count	65 per cent off list.
Machine bolts, 100 count	65 per cent off list.
Carriage bolts, 100 count	65 per cent off list.
Nuts, all styles, 100 count	65 per cent off list.
Large rivets, base per 100 lb.	\$3.50
Wire, black, soft ann'd, base per 100 lb.	\$2.70
Common wire nails, per keg	\$2.834
Cement coated nails, per keg	\$2.834

On plates, structurals, bars, reinforcing bars, bands, hoops and blue annealed sheets, base applies to orders of 400 to 9999 lb.  
\*Delivered in Pittsburgh switching district.

CHICAGO	
	Base per Lb.
Plates and structural shapes	3.20c.
Soft steel bars	2.95c.
Cold-fn. steel bars:	
Rounds and hexagons	3.50c.
Flats and squares	3.50c.
Hot-rolled strip	3.30c.
Hot-rolled annealed sheets (No. 24)	3.85c.
Galv. sheets (No. 24)	4.55c.
Hot-rolled sheets (No. 10)	3.05c.
Spikes (keg lots)	3.50c.
Track bolts (keg lots)	4.65c.
Rivets, structural (keg lots)	3.65c.
Rivets, boiler (keg lots)	3.75c.
Machine bolts	60 and 5
Carriage bolts	60 and 5
Lag screws	60 and 5
Hot-pressed nuts, sq. tap. or blank	60 and 5
Hot-pressed nuts, hex. tap. or blank	60 and 5
Hex. head cap screws	80
Cup point set screws	70 and 10
Flat head bright wood screws	37 1/2 and 10
Spring cotter pins	50
Store bolts in full packages	70
Rd. hd. tank rivets, 7/16 in. and smaller	57 1/2
Wrought washers	\$4.50 off list
No. 8 black ann'd wire per 100 lb.	\$3.85
Com. wire nails, base per keg	3.05
Cement c'd nails, base per keg	3.05

On plates, shapes, bars, hot-rolled strip and heavy hot-rolled sheets, the base applies on orders of 400 to 9999 lb. All prices are f.o.b. consumers' plants within the Chicago switching district.

NEW YORK	
	Base per Lb.
Plates, 1/4 in. and heavier	3.40c.
Structural shapes	3.37c.
Soft steel bars, small shapes	3.25c.

Iron bars	3.22c.
Iron bars, swed. charcoal	6.75c. to 7.25c.
Cold-fn. shafting and screw stock:	
Rounds and hexagons	3.92c.
Flats and squares	4.42c.
Cold-rolled; strip, soft and quarter hard	3.32c.
Hoops	3.52c.
Bands	3.52c.
Hot-rolled sheets (No. 10)	3.27c.
Hot-rolled ann'd sheets (No. 24*)	3.85c.
Galvanized sheets (No. 24*)	4.50c.
Long term sheets (No. 24)	5.20c.
Standard tool steel	11.00c.
Wire, black annealed (No. 10)	3.25c.
Wire, galv. (No. 10)	3.85c.
Tire steel, 1 x 1/2 in. and larger	3.85c.
Open hearth spring steel	4.00c. to 10.00c.
Common wire nails, base, per keg	\$3.21
Machine bolts, cut thread:	Per Cent Off List
All diameters	70
Carriage bolts, cut thread:	Off List
All diameters	70
Boiler tubes:	Per 100 Ft.
Lap welded, 2-in.	\$18.05
Seamless welded, 2-in.	19.24
Charcoal iron, 2-in.	24.94
Charcoal iron, 4-in.	63.65

\*No. 28 and lighter, 36 in. wide, 20c. higher per 100 lb.

ST. LOUIS	
	Base per Lb.
Plates and struc. shapes	3.44c.
Bars, soft steel or iron	3.19c.
Cold-fn. rounds, shafting, screw stock	3.74c.
Hot-rolled annealed sheets (No. 24)	4.09c.
Hot-rolled sheets (No. 10)	4.79c.
Black corrug. sheets (No. 24)	3.29c.
Galv. corrug. sheets	4.79c.
Structural rivets	3.99c.
Boiler rivets	3.09c.
Tank rivets, 7/16 in. and smaller	55
Machine and carriage bolts, lag screws, fittings up bolts, bolt ends, plow bolts, hot-pressed nuts, square and hexagon, tapped or blank, semi-finished nuts:	
1000 lb. or over	70 and 10
200 to 999 lb.	67 1/2 and 10
100 to 199 lb.	65 and 10
Less than 100 lb.	60 and 10

\*No. 26 and lighter take special prices.

PHILADELPHIA	
	Base per Lb.
*Plates, 1/4-in. and heavier	2.95c.
*Structural shapes	2.95c.
*Soft steel bars, small shapes, iron bars (except bands)	2.90c.
*Reinforce steel bars, sq. twisted and deformed	2.95c.
Cold-finished steel bars	3.73c.
Steel hoops	3.40c.
*Steel bands, No. 12 and 3/16 in., incl.	3.15c.
Spring steel	3.00c.
*Hot-rolled annealed sheets (No. 24)	3.55c.
*Hot-rolled annealed sheets (No. 10)	3.05c.
Diam. pat. floor plates, 1/4 in.	4.95c.
Swedish iron bars	6.25c.

These prices are subject to quantity differentials except on reinforcing and Swedish iron bars.  
\*Base prices subject to deduction on orders aggregating 4000 lb. or over.  
†For 50 bundles or over.  
‡For less than 2000 lb.

CLEVELAND	
	Base per Lb.
Plates and struc. shapes	3.31c.
Soft steel bars	2.95c.
Reinforce steel bars	2.10c.
Cold-finished steel bars	3.40c.
Flat-rolled steel under 1/4 in.	3.36c.
Cold-finished strip	3.00c.
Hot-rolled annealed sheets (No. 24)	3.96c.
Galvanized sheets (No. 24)	4.81c.
Hot-rolled sheets (No. 10)	3.11c.
Hot-rolled 3/16 in. 24 to 48 in. wide sheets	3.56c.
Black ann'd wire, per 100 lb.	\$2.65
No. 9 galv. wire, per 100 lb.	2.00
Com. wire nails, base per keg	2.40

\*Plus mill, size and quantity extras.  
†Outside delivery 10c. less.

CINCINNATI	
	Base per Lb.
Plates and struc. shapes	3.40c.
Bars, soft steel or iron	3.15c.
New billet reinforce bars	3.25c.
Rail steel reinforce bars	3.25c.
Hoops and bands, 3/16 in. and lighter	3.45c.
Cold-finished bars	3.70c.
Hot-rolled annealed sheets (No. 24)	4.00c.
Galv. sheets (No. 24)	4.70c.
Hot-rolled sheets (No. 10)	3.20c.
Structural rivets	4.35c.
Small rivets	55 per cent off list
No. 9 ann'd wire, per 100 lb. (1000 lb. or over)	\$2.91
Com. wire nails, base per keg (1 to 24 kegs)	3.50
25 to 50 kegs	3.30
Larger quantities	3.10
Cement c'd nails, base 100-lb. keg	3.50
Chain, 1-in., per 100 lb.	44.96
Seamless steel boiler tubes, 2-in.	\$19.03
4-in.	44.96
Lap-welded steel boiler tubes, 2-in.	18.10
4-in.	42.32

BUFFALO	
	Base per Lb.
Plates	3.37c.
Struc. shapes	3.25c.
Soft steel bars	3.00c.
Reinforcing bars	2.60c.
Cold-fn. flats and sq.	3.55c.
Round and hex.	3.55c.
Cold-rolled strip steel	3.19c.
Hot-rolled annealed sheets (No. 24)	4.05c.
Heavy hot-rolled sheets, 3/16 in., 24 to 48 in. wide	3.62c.
Galv. sheets (No. 24)	4.70c.
Bands	3.42c.
Hoops	3.42c.
Hot-rolled unannealed sheets	3.17c.
Com. wire nails, base per keg	\$3.85
Black wire, base per 100 lb.	3.55

BOSTON	
	Per Lb. Base
Beams, channels, angles, tees, zees	3.52c.
H beams and shapes	3.52c.
Plates—sheared, tank and univ. mill, 1/4 in. thick and heavier	3.53c.
Floor plates, diamond pattern	5.33c.
Bar and b. shapes (mild steel)	3.30c.
Bands 3/16 in. thick and No. 12 ga. incl.	3.60c. to 4.60c.
Half rounds, half ovals, ovals and berels	4.55c.
Tire steel	4.55c.
Cold-finished rounds and hexagons	4.00c.
Cold-rolled strip steel	3.245c.

Cold-finished squares and flats	3.65c.
Blue annealed sheets, No. 10 gal.	3.60c.
One pass cold-rolled sheets No. 24	4.15c.
Galvanized steel sheets, No. 24 ga.	4.85c.
Lead coated sheets, No. 24 ga.	5.80c.

Prices delivered by truck in metropolitan Boston, subject to quantity differentials.

MILWAUKEE	
	Base per Lb.
Plates and structural shapes	3.31c.
Soft steel bars	3.06c.
Hot-rolled strip	3.41c.
Hot-rolled sheets (No. 10)	3.16c.
Hot-rolled annealed sheets (No. 24)	3.96c.
Galvanized sheets (No. 24)	4.66c.
Cold-finished steel bars	4.36c.
Cold-rolled strip	3.30c.
Structural rivets (keg lots)	3.86c.
Boiler rivets (keg lots)	3.96c.
Track spikes (keg lots)	3.71c.
Track bolts (keg lots)	4.86c.
Black annealed wire	3.10c.
Com. wire nails	2.90c.
Cement coated nails	2.90c.
Machine bolts (100 pcs. and over)	70
Carriage bolts (100 pcs. and over)	70
Hot-pressed nuts, sq. and hex., tapped or blank (keg lots)	60 and 5

Prices given above are delivered Milwaukee.

On plates, shapes, bars, hot-rolled strip and heavy hot-rolled sheets, the base applies on orders of 400 to 9999 lb. On galvanized and No. 24 hot-rolled annealed sheets the prices given apply on orders of 400 to 3499 lb. On cold-finished bars the prices are for orders of 300 to 499 lb.

PACIFIC COAST	
	Base per Lb.
San Fran- Los	
cisco Angeles Seattle	
Plates, tank and U. M.	3.55c. 3.70c. 3.55c.
Shapes, standard	3.55c. 3.70c. 3.55c.
Soft steel bars	3.60c. 3.70c. 3.60c.
Reinforcing bars	3.50c. 3.50c. 3.60c.
Hot-rolled annealed sheets (No. 24)	4.40c. 4.45c. 4.40c.
Hot-rolled sheets (No. 10)	3.75c. 3.80c. 3.75c.
Galv. sheets (No. 24)	5.00c. 5.05c. 5.00c.
Cold finished steel:	
Rounds	5.95c. 5.95c. 4.75c.
Squares and hexagons	7.20c. 7.20c. 6.00c.
Flats	7.70c. 7.70c. 7.00c.
Common wire nails—base per keg less carload	\$3.40 \$3.25 \$3.30

All items subject to differentials in quantity.

TOOL STEEL	
	Base per Lb.
High speed	37c.
High carbon chrome	32c.
Oil hardening	22c.
Extra	17c.
Regular	14c.

Prices are same for warehouse distribution at all points on or East of Mississippi River. West of Mississippi quotations are 1c. a lb. higher.

## Another Large Rail Order Placed in South

BIRMINGHAM, Feb. 19. — The Southern Railway has purchased 16,000 tons of rails from the Tennessee Coal, Iron & Railroad Co.

Steel production was stepped up sharply last week with the reopening of the Ensley rail mill of the Tennessee company. At the Ensley works, five open-hearths were fired. The previous week three blast furnaces had been placed in operation. There is now more ac-

tivity at Ensley than at any other time since middle July.

Twelve open-hearth units produced steel last week, as compared with seven the previous week. The schedule for the current week is also 12.

A fair demand exists for sheets and wire products.

The pig iron market is moving along rather slowly, with foundries buying iron as needed. The month will probably be slightly better than January.

Eight blast furnaces are operating, no change having taken place since last week. There is a

prospect of an increase to nine within the next few weeks. Republic Steel Corp'n. is relining a stack and this work will be completed around the first of the month. When this furnace is lighted, Republic will have two stacks in blast.

The spring convention of the Electrochemical Society will be held at the Hotel Roosevelt in New Orleans, March 21 through 23. Dr. Colin G. Fink, Columbia University, New York, is secretary.

# Non-Ferrous Metals Largely Unaffected By Supreme Court Gold Decision

Copper Sales Well Maintained—Tin Quiet with Prices Higher on Sterling Strength—Lead Price Up \$2 a Ton—Zinc Very Dull

NEW YORK, Feb. 19.—The gold clause decision yesterday had no particular influence on the metal markets and copper was no exception. In fact, sales yesterday amounted to only about 1000 tons, having been considerably below some of the high figures established last week. Transactions for the month to date, not including today, have totaled about 20,000 tons, a substantial increase over the figure for the corresponding January period. January statistics were not surprising to the trade, but the reduction of about 16,000 tons in North and South American stocks was an encouraging factor. January apparent consumption of copper was in line with expectations, reflecting

the increased activity of copper and brass fabricators. If February buying can be taken as a criterion, fabricating operations this month are even higher. The Blue Eagle price remains unchanged at 9c. a lb., delivered Connecticut Valley. Quotations abroad are somewhat stronger today, with sales of electrolytic copper reported from London at 6.70c. to 6.75c. a lb., usual Continental base ports.

## Tin

Buying of tin futures was somewhat more active yesterday, following the gold clause decision, but interest petered out today, and the market is again very quiet. Quotations were advanced yesterday because of strength in Sterling ex-

change, but Straits metal was quoted down to 50c. a lb. last week, and had advanced to only 50.35c. today, compared with 50.75c. last Monday. A little business was done in low grade tin last week, but the London market was kept under careful observance, and the situation there is still being watched. Until conditions are entirely clarified it is unlikely that further pool support will be forthcoming in that market. Standard spot tin was quoted in London this morning at £229 10s., while futures had rallied somewhat to £225 15s. Straits metal at London was available at £230, and the market in the East was quotable at £229 12s. 6d.

## Lead

The lead market was advanced \$1 a ton last Wednesday and is still quotable at 3.40c. a lb., St. Louis, and 3.55c., New York. As had been the case before, one large interest continues to ask a \$1 a ton premium on sales in the East. The market has not been particularly active and was unaffected by the gold clause decision. February metal is largely sold, but buying for March has not yet got under way on a broad scale. Consumption seems to be well-sustained and buying is well diversified among the consuming industries. The ore price was also advanced \$1 last week and is now quotable at \$33 a ton.

## Zinc

In spite of continued dull demand, quotations are still fairly well held at 4.05c. a lb., New York, and 3.70c., East St. Louis. Only a single transaction at a lower level has come to light and this involved a small tonnage. Sales last week are unofficially reported at 1600 tons, which is in line with the recent average. Sellers are of the opinion that production curtailment is the only solution to the unsatisfactory condition of the market, and, while conversations on the subject are said to be in progress, no agreement has apparently been reached. The market on concentrates is unchanged at \$25 for flotation and \$26 a ton for mill grades. Last week's production amounted to about 8500 tons, with sales of 6000 tons, and shipments of approximately 8050 tons.

The Second International Rail Assembly, which was held in Zurich in 1932, has decided to hold the Third International Rail Assembly in Budapest. The Hungarian Association for Testing Materials, which has taken upon itself the preparation and arrangement of this assembly, has scheduled it for Sept. 8 to 12.

## The Week's Prices. Cents Per Pound for Early Delivery

	Feb. 13	Feb. 14	Feb. 15	Feb. 16	Feb. 18	Feb. 19
Electrolytic copper, N. Y.*	8.75	8.75	8.75	8.75	8.75	8.75
Lake copper, N. Y.	9.12½	9.12½	9.12½	9.12½	9.12½	9.12½
Straits tin, Spot, New York	50.40	50.00	50.00	50.50	50.35	50.35
Zinc, East St. Louis	3.70	3.70	3.70	3.70	3.70	3.70
Zinc, New York	4.05	4.05	4.05	4.05	4.05	4.05
Lead, St. Louis	3.40	3.40	3.40	3.40	3.40	3.40
Lead, New York	3.55	3.55	3.55	3.55	3.55	3.55

\*Refinery quotations; price ¼c. higher delivered in Connecticut.

Aluminum, virgin 99 per cent plus, 19c. to 22c. a lb., delivered.

Aluminum, remelt No. 12 (alloy), carload lots delivered, 14c. a lb., average for week.

Nickel electrolytic cathode, 35c. a lb., delivered; shot and ingot, 36c. a lb., delivered.

Antimony, 14.50c. a lb., New York.

Brass ingots, 85-5-5-5, 8.25c. a lb., New York and Philadelphia.

### From New York Warehouse

#### Delivered Prices, Base per Lb.

Tin, Straits pig	52.00c. to 53.00c.
Tin, bar	54.00c. to 55.00c.
Copper, Lake	10.25c. to 11.00c.
Copper, electrolytic	10.00c. to 10.50c.
Copper, castings	9.75c. to 10.75c.
*Copper sheets, hot-rolled	16.00c.
*High brass sheets	14.25c.
*Seamless brass tubes	16.00c.
*Seamless copper tubes	16.25c.
*Brass rods	12.75c.
Zinc, slabs	5.75c. to 6.75c.
Zinc, sheets (No. 9), casks, 1200 lb. and over	10.25c.
Lead, American pig	4.50c. to 5.50c.
Lead, bar	5.50c. to 6.50c.
Lead, sheets	7.25c.
Antimony, Asiatic	15.50c. to 16.50c.
Alum., virgin, 99 per cent, plus	23.30c.
Alum., No. 1 for remelting, 98 to 99 per cent	18.00c. to 19.00c.
Solder, ½ and ⅓	30.00c. to 31.00c.
Babbitt metal, commercial grades	25.00c. to 60.00c.

\*These prices are also for delivery from Chicago and Cleveland warehouses.

### From Cleveland Warehouse

#### Delivered Prices per Lb.

Tin, Straits pig	54.00c.
Tin, bar	56.00c.

Copper, Lake	10.00c.
Copper, electrolytic	10.00c.
Copper, castings	9.75c.
Zinc, slabs	5.50c. to 5.75c.
Lead, American pig	4.50c. to 4.75c.
Lead, bar	5.75c.
Antimony, Asiatic	16.50c.
Babbitt metal, medium grade	18.50c.
Babbitt metal, high grade	59.00c.
Solder, ½ and ⅓	32.75c.

### Old Metals, Per Lb., New York

Buying prices are paid by dealers for miscellaneous lots from smaller accumulators, and selling prices are those charged to consumers after the metal has been prepared for their uses. (All prices are nominal.)

	Dealers' Buying Prices	Dealers' Selling Prices
Copper, hvy. crucible	5.37½c.	6.12½c.
Copper, hvy. and wire	5.25c.	5.75c.
Copper, light and bottoms	4.25c.	4.75c.
Brass, heavy	2.75c.	3.37½c.
Brass, light	2.00c.	2.75c.
Hvy. machine composition	4.37½c.	4.87½c.
No. 1 yel. brass turnings	3.62½c.	4.12½c.
No. 1 red brass or compos. turnings	3.37½c.	4.37½c.
Lead, heavy	2.62½c.	3.00c.
Zinc	1.87½c.	2.25c.
Cast aluminum	9.62½c.	10.75c.
Sheet aluminum	11.00c.	12.50c.



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## Fabricated Structural Steel

Lettings in Fair Volume—New Projects Heavy

**A**WARDS of 13,250 tons include 2000 tons for a Diesel locomotive plant at Chicago for the General Motors Corp'n. and 1450 tons for a bridge at East St. Louis, Ill. In the East, the New York Central has awarded 1400 tons for depressing its tracks in New York between Fifty-fourth and Sixty-fourth Streets. New projects of 60,000 tons are the largest since the last week in August, 1933. Almost one-half of this tonnage is required for suspension spans for the Triborough bridge in New York. Other sizable new jobs include 15,000 tons for transmission towers for the Colorado River project and 6000 tons for dam No. 26 in the Mississippi River at Alton, Ill. Plate lettings call for only 700 tons. Structural steel awards for the week follow:

### NORTH ATLANTIC STATES

Rumford, Me., 350 tons, State bridge, to Pittsburgh-Des Moines Steel Co.

Roxbury, Mass., 280 tons, warehouse, to Rogers Structural Steel Co.

Bronx, New York, 260 tons, school No. 80, to American Bridge Co.

Brooklyn, 300 tons, garage for Daily News, to Ingalls Iron Works.

Brooklyn, 235 tons, State office building, to Lehigh Structural Steel Co.

New York, 1400 tons, depressed tracks of New York Central Railroad between Fifty-fourth and Sixty-fourth Streets, to American Bridge Co.

### THE SOUTH

Metter, Ga., 115 tons, bridge, to Virginia Bridge & Iron Co., Inc.

Tatnall County, Ga., 300 tons, State prison buildings, to Ingalls Iron Works.

State of Georgia, 560 tons, highway bridges at Augusta and Vinings, to American Bridge Co.

Fredericksburg, W. Va., 125 tons, addition to Sylvania Corp'n. building, to Belmont Iron Works.

State of West Virginia, 480 tons, power houses at Marmette and London dams on

Kanawha River, to Virginia Bridge & Iron Co.

Kerr County, Tex., 505 tons, bridge, to Pittsburgh-Des Moines Steel Co.

### CENTRAL STATES

Troy, Ohio, 330 tons, building for Gunned Products Co., to Ingalls Iron Works.

Austin, Ohio, 155 tons, highway bridge, to Fort Pitt Bridge Works Co.

Brown County, Ind., 125 tons, bridge, to Central States Bridge Co.

Morgan County, Ind., 305 tons, bridge, to Central States Bridge Co.

Cook County, Ill., 210 tons, beam bridge, to Gage Structural Steel Co.

Chicago, 2000 tons, Diesel locomotive plant for General Motors Corp'n., to Austin Co.

East St. Louis, Ill., 1450 tons, bridge, to American Bridge Co.

Dallas County, Iowa, 190 tons, bridge spans, to Des Moines Steel Co.

Humboldt, Iowa, 175 tons, bridge, to Des Moines Steel Co.

Ottumwa, Iowa, 850 tons, viaduct, to Wisconsin Bridge & Iron Co.

Mason City, Iowa, 150 tons, store, to Des Moines Steel Co.

Chesterfield, Mo., 175 tons, bridge, to Stupp Brothers Bridge & Iron Co.

St. Charles County, Mo., 140 tons, to American Bridge Co.

Vermillion, S. D., 110 tons, bridge, to McClintic-Marshall Corp'n.

Beatrice, Neb., 195 tons, bridge, to McClintic-Marshall Corp'n.

### WESTERN STATES

Fort Peck, Mont., 100 tons, dredge elbows, to McClintic-Marshall Corp'n.

Sheridan County, Wyo., 150 tons, State overhead crossing, to Missouri Valley Bridge & Iron Co.

Yuma and Washington Counties, Colo., 140 tons, State highway structure, to American Bridge Co., previously reported to an unnamed bidder.

Clarksburg, Cal., 120 tons, Amalgamated Sugar Co. plant, to Palm Iron & Steel Co.

Long Beach, Cal., 120 tons, alteration on arts and science building at Jefferson high school, to Virginia Bridge & Iron Co.

Trona, Cal., 140 tons, American Potash & Chemical Co. plant, to Ingalls Iron Works.

Los Angeles, 200 tons, alterations at Polytechnic junior high school, to Southwest Welding Co.

Ventura County, Cal., 170 tons, sea walls, to Columbia Steel Corp'n.

Monterey, Cal., 300 tons, bridge, to Pacific Coast Steel Corp'n.

Grand Coulee Dam, Wash., 200 tons, warehouse, to American Bridge Co.

### SOUTH AMERICA

Argentina, 260 tons, smelting plant for St. Joseph Lead Co., to Jones & Laughlin Steel Corp'n.

### NEW STRUCTURAL STEEL PROJECTS

#### NORTH ATLANTIC STATES

Providence, R. I., 400 tons, Mount Pleasant Street school.

Cranston, R. I., 150 tons, junior high school.

South Kingston, R. I., 100 tons, State college library.

New York, 32,000 tons, suspended spans and viaduct approaches to Tri-Borough Bridge; bids due March 14 to Tri-Borough Bridge Authority.

New York, 475 tons, grade crossing elimination at 171st Street.

Long Island Railroad, 1500 tons, grade crossing elimination.

Newark, N. J., 175 tons, bridge.

#### SOUTH AND SOUTHWEST

Wheeling, W. Va., 350 tons, redesigning post office.

Kerrville, Tex., 500 tons, bridge.

Phoenix, Ariz., 800 tons, post office; Great Lakes Construction Co. low bidder on general contract.

#### CENTRAL STATES

Muncie, Ind., 150 tons, bridge for Nickel Plate Railroad.

Alexandria, Ind., 150 tons, tramway supports.

Alton, Ill., 6000 tons, dam No. 26 in Mississippi River; Government plans ready March 1 for bids April 1.

State of Illinois, 700 tons, bridges.

#### WESTERN STATES

Boulder City, Nev., 270 tons, control



cable supports at power house; bids under advisement.

**Mare Island, Cal.**, 200 tons, Government building.

**Mare Island**, 800 tons, gantry crane for Navy Yard, Specification 7855; Star Iron & Steel Co. low bidder.

**Fresno, Cal.**, 400 tons, city auditorium; bids Feb. 21.

**San Francisco**, 600 tons, Marina junior high school; bids taken Feb. 20.

**Los Angeles**, 850 tons, tunnel supports for Metropolitan Water District, Specification M-2038; bids under advisement.

**Los Angeles**, 15,000 tons, transmission towers on Colorado River project; bids soon.

#### FABRICATED PLATE

##### AWARDS

**Fort Peck, Mont.**, 400 tons, dredge pipe, to McClintic-Marshall Corpn.

**Fort Peck**, 300 tons, dredge pipe; bids Feb. 21.

##### NEW PROJECTS

**Swedeland, Pa.**, 175 tons, tanks.

**Charleston, W. Va.**, 900 tons, 12 sand and gravel barges.

**Mattoon, Ill.**, 275 tons, tanks.

**Chicago**, 400 heads and 200 domes for tank cars for Union Metal Products Co.

#### SHEET PILING

##### NEW PROJECTS

**Alton, Ill.**, 230,000 sq. ft., dam No. 26 in Mississippi River; plans ready March 1 for bids April 1.

## Boston Scrap Market Is Easier

**BOSTON**, Feb. 19.—Bundled skeleton and similar material and steel turnings are 25c. a ton lower, and the general tone of the scrap market is easier. The movement of export material has declined, primarily because of weather and supply conditions. Providence, R. I., interests expect to export scrap around April 1, and local brokers have considerable business booked, but when shipments will be made is problematical. A Rockville, Conn., textile plant has been sold with equipment for resale. Some of the equipment will be scrapped by a Providence firm.

Business in pig iron continues in small lots, many of them truckloads, and improved sales apparently are as far away as ever.

## Sheet Demand Sustained At Cincinnati

**CINCINNATI**, Feb. 19.—District sheet demand is being sustained at more than 90 per cent of capacity output. Automotive business has eased slightly, but the slack has been taken up by broader general demand. All units of the leading interest are operating

at near capacity and the backlog is slightly greater than two weeks' rolling capacity. Despite the brisk demand, orders are limited to current requirements. In fact, mill interests are not prone to discuss the business situation with any degree of certainty beyond the present quarter. Anticipatory buying is nil. Price changes in the second quarter are unlikely.

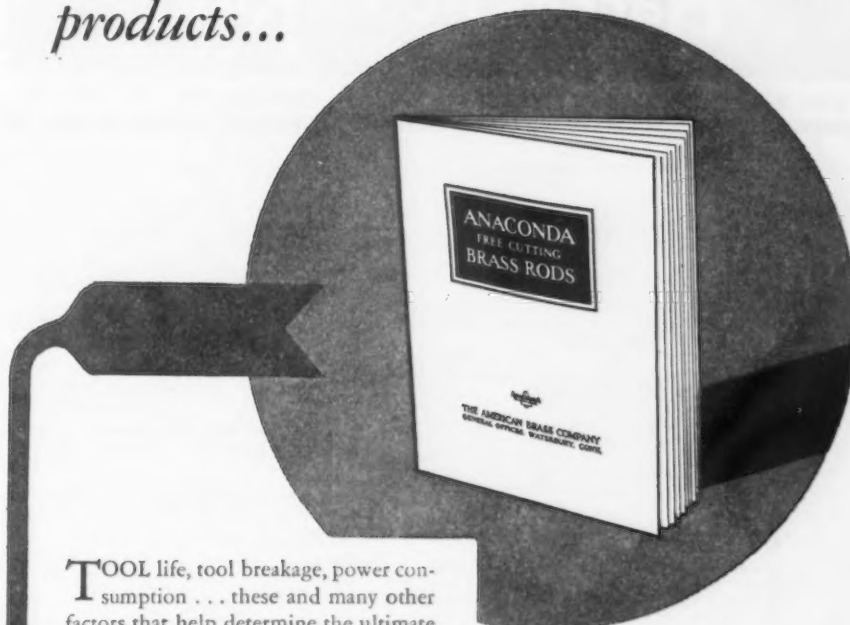
Spot pig iron business is averaging 800 tons a week. This is largely due to an increased melt

in jobbing and small foundries. Automotive and stove foundries are operating steadily and there has been a slight improvement in machine tool melt.

Movement of foundry coke tends upward in step with better melt. New business is for spot shipment.

The scrap market has weakened in the absence of substantial mill buying. Dealers' bids are down 25c. a ton. Speculation has almost stopped and dealers are not adding to yard supplies.

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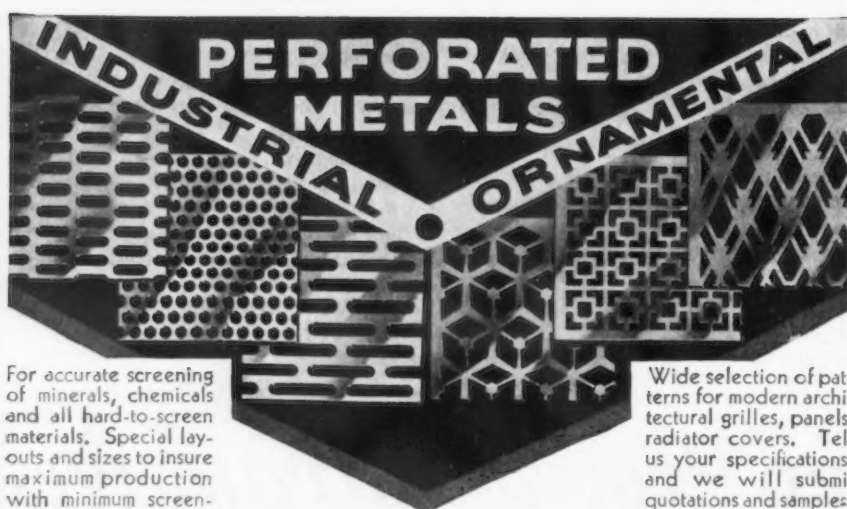
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## ANACONDA COPPER & BRASS

THE IRON AGE, February 21, 1935—71



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## Reinforcing Steel

Awards 12,800 Tons—New Projects  
4150 Tons

### AWARDS

Greenfield, Mass., 125 tons, sewage disposal plant, to Truscon Steel Co.

Kings and Queens Counties, N. Y., 320 tons, bridges, to Carroll-McCreary Co., Inc.

Pompton Plains, N. J., 125 tons, Erie Railroad bridge, to Igoo Brothers.

Reidsville, Ga., 800 tons, prison buildings, to Kalman Steel Corp.

Zanesville, Ohio, 1200 tons, for Muskingum Conservancy District; 600 tons each to Buffalo Steel Co., Buffalo, and L. B. Foster Co., Pittsburgh.

Milwaukee, 170 tons, institutional laundry, to Concrete Steel Co.

East St. Louis, Ill., 2100 tons, Cahokia Creek diversion canal, to Laclede Steel Co. and Missouri Rolling Mills Corp.

Los Angeles, 7030 tons, material for Metropolitan Water District, Specification 87, 2450 tons to Truscon Steel Co., 1780 tons to Concrete Engineering Co., 1800 tons to Soule Steel Co. and 1000 tons to West Virginia Rail Co.

San Francisco, 275 tons, Glenn Park school, to Concrete Engineering Co.

State of California, 205 tons, highway work in four counties, to unnamed bidders.

State of Montana, 190 tons, highway work in four counties, to unnamed bidders.

State of Oregon, 250 tons, highway work in five counties, to unnamed bidders.

### NEW REINFORCING BAR PROJECTS

Providence, R. I., 300 tons, Mount Pleasant Street school.

Cheshire, Mass., 100 tons, road work.

Cranston, R. I., 100 tons, junior high school.

State of Illinois, 400 tons, highway work; bids opened, Feb. 19.

Calumet City, Ill., 100 tons, school; lowest bid has overrun appropriation and project will probably be readvertised.

Alton, Ill., 1800 tons, dam No. 26 in Mississippi River; bids about March 1.

Yuba County, Cal., 120 tons, widening seven State bridges; bids March 6.

Los Angeles, 417 tons, county tunnel at Ocean and Colorado Avenues; bids March 14.

Los Angeles, 350 tons, subway at Union passenger terminal; general contract awarded.

Los Angeles, 100 tons, alterations at Polytechnic High School; bids under advisement.

State of Oregon, 245 tons, highway bridges in five counties; bids Feb. 28.

## This Week in Washington

(CONCLUDED FROM PAGE 48)

tinkering further with the value of the dollar should no longer be exercised. In passing on private bonds, the Court made a distinction and said they need not be paid in gold.

Greater confidence because of stabilization of the dollar is expected to aid not only domestic markets but foreign markets as well, because it is believed the decision may pave the way for international agreements on stabilization. Hitherto efforts to reach such agreements have proved barren. With definite knowledge of the dollar value, it is pointed out that there ought to be a clearer road looking to a more fixed relationship between currency exchanges.

No effort has been made by students to say exactly what the price situation may be as the result of the decision, except that it at least ought to be firmer, if not moved to a higher level. Nor is it believed bonds will reflect any substantial rise. They will probably become substantially more marketable, and a means of moving of goods in greater volume, including those of the heavy industries.

Psychologically, it is believed that decision will also be effective. It will give renewed confidence to the system of checks and balances on which the Government is founded. It will also continue faith in the Supreme Court as a check against radical and unconstitutional legislation, the fear of which obviously has been a hindering influence on industry.

## Cost of Living Rose During January

THE cost of living of wage-earners advanced 1.0 per cent from December, 1934, to January, 1935, according to the regular monthly index computed by the National Industrial Conference Board. This rise, considerably higher than the average seasonal gain, was principally due to a marked increase in food prices.

The cost of living as a whole in January was 5.3 per cent higher than a year ago, 10.7 per cent higher than in January, 1933, but still 18.3 per cent lower than in January, 1929.

The general level of wholesale commodity prices was unchanged during the week ended Feb. 9, according to the Bureau of Labor Statistics, Department of Labor. The average level remained at 79.1 per cent of the 1926 average, the highest level reached since the inauguration of the weekly index in January, 1932.

The Navy Department has awarded contracts for 825 tons of medium steel bars and 150 tons of cold rolled steel bars. The medium steel bar tonnage was distributed as follows: Carnegie Steel Co., 411 tons; Illinois Steel Co., 367 tons; Crucible Steel Co., 16 tons; Penn Galvanizing Co., 13 tons; Cann & Saul, Philadelphia, 11 tons and Jones & Laughlin Steel Corp., seven tons. Of the cold-rolled steel bar tonnage 49 tons was awarded to the American Steel & Wire Co. and 101 tons to the Wyckoff Drawn Steel Co.

## TRADE NOTES

**Bunting Brass & Bronze Co.**, Toledo, Ohio, has opened branch sales office and warehouse at 3325 Locust Street, St. Louis, where it will carry complete stock of industrial bronze bearings, bronze bars, babbitt, electric motor bearings, automotive bearings, bushings, king-bolt sets, connecting rod liners, etc.

**Allis-Chalmers Mfg. Co.**, Milwaukee, has removed its Pittsburgh district office to 2037 Koppers Building. Guy V. Woody is manager.

**Ohio Forge & Machine Corp.**, Cleveland, successor to Gears & Forgings, Inc., manufacturer of gears, speed reducers, forgings and special machinery, has appointed Denton & Anderson Co., 1225 West Washington Boulevard, Chicago, as its representatives in Chicago territory.

**Claud S. Gordon Co.**, 314 Indiana Terminal Warehouse Building, Indianapolis, has been appointed district representative of Hevi Duty Electric Co., Milwaukee. S. A. Silbermann, who has been acting as sub-agent for several years for Hevi Duty company, will be in charge of Indianapolis office and will have as territory Kentucky and portion of Indiana south of Logansport.

**A & B Scrap Iron Builders' & Machinery Supplies, Inc.**, 262 East Houston Street, New York, has dissolved. R. A. Lipman, formerly president of this corporation, is now transacting business at his 199 Allen Street office and yard.

**York Corrugating Co.**, York, Pa., will open branch warehouse, catering to the sheet metal and tinsmith trade, at 112 Spring Street, Paterson, N. J., on March 1.

**American Rolling Mill Co.**, Middletown, Ohio, has designed new label for use of manufacturers of porcelain enameled articles made of Armco ingot iron. New label is metal-faced and carries inscription "porcelain enamel on Armco ingot iron."

**SKF Industries, Inc.**, has opened branch store at 407 South Fourth Street, Minneapolis, in charge of A. Kishkunas. New office will carry complete stock of SKF ball and roller bearings, pillow blocks, and hangers.

**Homestead Valve Mfg. Co.**, Coraopolis, Pa., has appointed the following exclusive representatives for the sale and distribution of Homestead Valves: Carey Machinery & Supply Co., 119 East Lombard St., Baltimore; L. E. Livingstone, 2012 Ward Parkway, Fort Worth, Tex.; Charles A. Randorf, 83 Delham Avenue, Buffalo; and Atkins, Kroll & Co., 260 California St., San Francisco, as exclusive representative in the Philippine Islands.

**W. G. Nichol Co.**, Milwaukee, machine tool dealer, has removed its offices from 1010 Mariner Tower to 709-711 West Michigan Street.

**Gear & Transmissions Co.**, 3600 South Oakley Avenue, Chicago, has been organized to sell and service gear and transmission installations. Company will provide daily delivery service in Chicago district on stock gears, speed reducers, roller chain and sprockets, silent chain and sprockets, hangers, V-belt drives and pulleys.

## STEEL FOR INDUSTRY

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Each Tool Steel Application

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### TOOL STEEL TUBING NON-SHRINK OIL HARDENING

Saves Weight and Machining Costs for  
**RING DIES—SPACERS—BUSHINGS**

Shipment From Stock Up to 12" O.D. 2" Wall  
Larger Sizes Available

**Complete Stocks of BALL BEARING TUBING**  
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BOLT EXTRUSION DIES  
TIPPED CUTTING TOOLS

### TUNGSTEN ELECTRIC CORPORATION

BISSETT STEEL DIVISION

**American Rolling Mill Co.**, Middletown, Ohio, has issued an illustrated four page circular, in color, entitled: "Fine Finishes Make Fine Products." Specific data are included as to applications and working properties of Armco 18-8 and Armco 17.

**Temperature Control.**—Foxboro Co., Foxboro, Mass. Bulletin, loose leaf. Rotax electrically-operated controllers. Facts concerning the products, their construction and operation. Illustrations, drawings and tabulated information. A second bulletin, designated as the No. 188 and entitled "Wet and Dry," is a more elaborate treatise of industrial humidity and drying

processes. It consists of 31 loose-leaf pages devoted to illustrations, charts, tabulations and installations pertaining to the requirements of various industries.

**Gisholt Machine Co.**, Madison, Wis., has opened Eastern district sales office at 538 Industrial Building, 1060 Broad Street, Newark, N. J., in charge of R. D. Heflin.

**Reed-Prentice Corp.**, Worcester, Mass., has secured from Navy Department orders for engine lathes for Coast Guard and Navy ships; also additional orders from shipbuilders for Navy boats, totaling \$95,000.

THE IRON AGE, February 21, 1935—73





# Speedy Delivery!

You get it when you purchase

## BOLTS NUTS SCREWS

from

## CLARK BROS BOLT CO.

Clark Street  
MILLCDALE, CONN.



## Cast Iron Pipe

**Sterling, Mass.**, will soon take bids for water pipe lines; also for elevated steel tank and tower, and municipal pumping plant. **Fay, Spofford & Thorndike**, 44 School Street, Boston, are consulting engineers.

**Williamsport Water Co.**, Williamsport, Pa., plans extensions in pipe lines in Loyalsock Township for water supply.

**Warrior, Ala.**, closes bids Feb. 27 for about 17,700 ft. of 2, 6 and 8-in. for water system; also for elevated steel tank, pumping equipment and other waterworks construction. **Totten & Loving**, Guin, Ala., are consulting engineers.

**Aransas Pass, Tex.**, plans water pipe lines. Fund of \$38,000 has been arranged for this and sewerage improvements. **Hammon & Griffith, Inc.**, Sherman Building, Corpus Christi, Tex., is consulting engineer.

**Abernathy, Tex.**, asks bids until Feb. 26 for 2, 6 and 8-in. for water system; also for 50,000-gal. elevated steel tank and tower. **H. N. Roberts**, Lubbock, Tex., is consulting engineer.

**Sunset, La.**, asks bids until Feb. 26 for water pipe lines and other waterworks equipment. **J. B. McCrary Co., Inc.**, Atlanta, Ga., is consulting engineer.

**Cumberland, Ky.**, plans water pipe lines. Fund of \$90,000 has been secured through Federal aid for this and waterworks station and auxiliary equipment.

**Kalamazoo, Mich.**, State Institution has awarded 7700 ft. of 10-in. to **James B. Clow & Sons**.

**Griggsville, Ill.**, has placed 500 tons with **James B. Clow & Sons**.

**Marion, Wis.**, closes bids March 1 for pipe for water system; also for elevated steel tank and tower, motor-driven and auxiliary gas engine-driven pumping machinery, and other waterworks equipment. **A. E. McMahon Engineering Co.**, Menasha, Wis., is consulting engineer.

**Adams, Wis.**, has placed 150 tons of 6 and 8-in. with **James B. Clow & Sons**.

**Seneca, Mo.**, will soon take bids for about 25,000 ft. of 2, 4 and 6-in. for water system; also for 75,000-gal. elevated steel tank and tower and other waterworks equipment. Cost about \$42,000. **Albert C. Moore**, Joplin, Mo., is consulting engineer.

**Deepwater, Mo.**, asks bids until Feb. 28 for about 29,000 ft. of various sizes for water system; also for elevated tank and tower, pumping machinery and other waterworks equipment. Fund of \$60,000 has been arranged. **E. T. Archer & Co.**, New England Building, Kansas City, Mo., are consulting engineers.

**Newport Beach, Cal.**, plans extensions in water pipe lines, including new municipal waterworks plant. Special election will be held Feb. 26 to approve bond issue of \$120,000 for project. **R. L. Patterson** is city engineer.

**South Pasadena, Cal.**, let 188 tons of 6 to 10-in. to **United States Pipe & Foundry Co.**

**Santa Barbara, Cal.**, has placed 130 tons with **American Cast Iron Pipe Co.**

**Redmond, Ore.**, has awarded 130 tons of 6 to 12-in. to **United States Pipe & Foundry Co.**

**Oakley, Utah**, will take bids soon on about 200 tons of 2 to 6-in.

## Pipe Lines

**Sabine Valley Gasoline Co.**, Shreveport, La., **H. R. Dickerson**, Shreveport, president, has let contract to **Apex Construction Co.**, Second National Bank Building, Houston, Tex., for new welded 2 to 20-in. steel pipe line from east Texas oil field district to new gasoline refinery in Gregg County, Tex., near Sabine River, where tract was recently leased, about 63 miles, including gathering system, for oil and natural gas. Work on multi-unit gasoline refinery will soon begin. Entire project will cost close to \$450,000.

**General Purchasing Officer**, Panama Canal, Washington, asks bids until Feb. 26 for 2400 ft. of black steel pipe, and 22,000 ft. of galvanized steel pipe (Schedule 3030).

**Lyons, Kan.**, plans steel pipe lines for municipal gas distribution. Bond issue of \$75,000 has been authorized at special election. **F. E. Devlin**, Wheeler-Kelly-Hagney Building, Wichita, Kan., is consulting engineer.

**Danciger Oil & Gas Co.**, Fort Worth, Tex., plans welded steel pipe line from

natural gas fields in Brazoria County, Tex., to point near Houston, Tex., about 45 miles, for gas supply at last-noted city and vicinity. Cost over \$200,000.

**San Antonio, Tex.**, plans steel pipe lines for municipal gas distribution, including main trunk line for natural gas. Cost over \$2,500,000. It is proposed to carry out financing through Federal aid. **C. Q. Quin**, mayor, is active in project.

**Hooker, Okla.**, has let contract to **C. L. Burt**, Hutchinson, Kan., for steel pipe lines for municipal gas distribution. Cost about \$50,000. Contractor plans early purchase of pipe, as well as regulators and accessory equipment. **F. E. Devlin**, Wheeler-Kelly-Hagney Building, Wichita, Kan., is consulting engineer.

**Chicago** will take bids Feb. 19 on 20,000 ft. of 2-in. standard steel pipe and 12,500 ft. of 2½-in.; 1500 ft. of 4-in. steel pole extensions, and 500 lb. of ¾-in., 4000 lb. of 1½-in., 3000 lb. of 1½-in., 1000 lb. of 2-in. and 500 lb. of 3-in. lead pipe sleeves.

## Railroad Equipment

**Shippers Car Line** is contemplating purchase of 10, 25 or 40 cars for transporting dry ice.

**Northern Refrigerator Line, Inc.**, has purchased 500 refrigerator cars from **Merchants Despatch, Inc.**

**North-Western of Brazil** is inquiring for 718 cars. **H. E. Couto Fernandes**, director, is located at Rio de Janeiro, Brazil.

**New York Central** has awarded contract to **Merchants Despatch, Inc.**, to repair 400 refrigerator cars.

**Norfolk Southern** has purchased two gasoline rail motor cars from **American Car & Foundry Co.**

**Southern Pacific Co.** has purchased 900,000 tie plates (approximately 6000 tons) from **Columbia Steel Co.**

**San Francisco** has received identical bids of \$37.25 on 200 rolled street car wheels.

**Chesapeake & Ohio** has ordered five high-tensile steel hopper cars from the **Bethlehem Steel Co.**

**Pere Marquette** is inquiring for 200 tons of tie plates.

**Edward G. Budd Manufacturing Co.** has licensed the **Plaggio Co.**, Italy, to build 15 stainless steel, streamlined self-propelled cars by the shot-weld process for service on the Italian Railways. The French Railways will build 32 twin articulated units under similar licenses. These cars will be electrically driven, the current being secured from overhead wires.

## RAILS

**New York Central** has applied to Interstate Commerce Commission for authority to borrow \$1,500,000 from PWA to purchase following supplies: 20,000 tons of rails, \$727,500; 1810 tons of splice bars, \$106,790; 6400 tons of tie plates, \$261,120; 550 tons of spikes and bolts, \$33,000; 750 tons of frogs, switches, anti-creeper, etc., \$77,590. The remainder of the fund, \$294,000, would go for labor.

**Virginian** is inquiring for 2200 tons of rails.

**Southern Railway** has bought 16,000 tons of rails from the **Tennessee Coal, Iron & Railroad Co.**

The **Meehanite Metal Corp.** of America, Pittsburgh, has granted licenses to manufacture all grades of Meehanite metals to the following foundries: **Warren Foundry & Pipe Co.**, Phillipsburg, N. J.; **Wehrle Co.**, Newark, Ohio; **Flourance Pipe Foundry & Machine Co.**, Philadelphia; **G. M. Hay**, Glasgow, Scotland, and **Establishments Zickel-Dehaitre**, Paris, France.

## German Steel Exports Rise on Barter Deals — Production High

**H**AMBURG, GERMANY, Feb. 19 (By Special Correspondence).—German steel exports in 1934 were 1,681,000 tons ahead of 1933, the increase having come chiefly from barter agreements.

Negotiations between New Orleans cotton exporters and German steel industry are nearing a point where an understanding is probable. Preliminary agreements have already been signed and the German delegation which commenced the negotiations at New Orleans reports that the barter contract will certainly be executed.

The United States has been quickly superseded by other suppliers of cotton in the German market. In 1934 imports of American cotton declined by 68 per cent, compared with 1933, whereas imports of cotton from Egypt, India, Peru, Brazil, Uganda-Kenya, etc., increased from 10 to 50 per cent. Almost all the cotton imports from these countries were obtained by barter.

Negotiations with the New Orleans merchants involve approximately 400,000 bales which would be shipped to Germany in payment for cotton bale ties, agricultural implements, structural steel, chemicals and other products. The closing of a contract for 3000 tons of cotton ties has already been reported.

### Ship Plate Cartel Endangered

The British-Continental ship plate cartel was extended only up to Jan. 31, and Continental makers are threatening to cancel the agreement unless the British industry agrees to renew the tube agreement also and to extend the non-competition agreement for structural steel in the Far East. It is probable, therefore, that though the British will not sign a cartel of a general nature with the Continental steel industry, present arrangements could be extended in certain markets, particularly in the Dominions and the Far East.

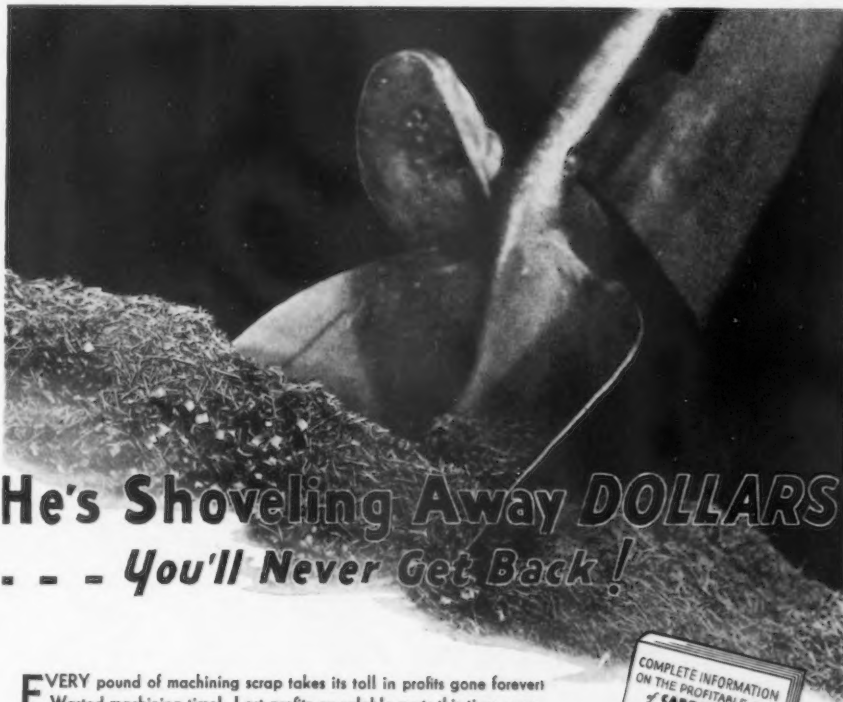
Reports that the negotiations with the American wire industry will be extended and that the IWECO and the American industry will come to an understanding regarding Far Eastern markets have been squelched. Prices for wire products are weakening further.

Delivery on nearly all steel products has had to be extended, as the German industry is working at near capacity on certain products. Domestic deliveries were extended by six to eight days and export shipment one week.

## Pacific Coast Steel Fabricators Organize

**F**ORMATION of a new organization to be known as the Pacific Coast Steel Fabricators Association is being considered to deal with problems and conditions peculiar to the Pacific Coast market. It

is understood that the following temporary officers have been elected: President, Reese Taylor, Consolidated Steel Corp., Los Angeles; vice-president, Paul Pigott, Pacific Car & Foundry Co., Seattle; second vice-president, George H. Raitt, Steel Tank & Pipe Co., Berkeley, Cal.; secretary-treasurer, Paul F. Gillespie, Judson Steel Corp., San Francisco; assistant secretary, T. A. L. Loretz, Consolidated Steel Corp., Los Angeles. It is reported that B. J. Osborne, Moore Dry Dock Co., Oakland, and Charles McGonigle, Poole & McGonigle, Portland, are interested in the organization. Temporary headquarters are at the Central Building, Los Angeles.



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... you'll save metal, machining time, tool cost, and increase your profit margin on every casting machined! This and other advantages of Carboloy tools are described in our latest booklet, "The Profitable Use of Carboloy Tools". Sent free to production executives, upon request.

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CEMENTED CARBIDE TOOLS

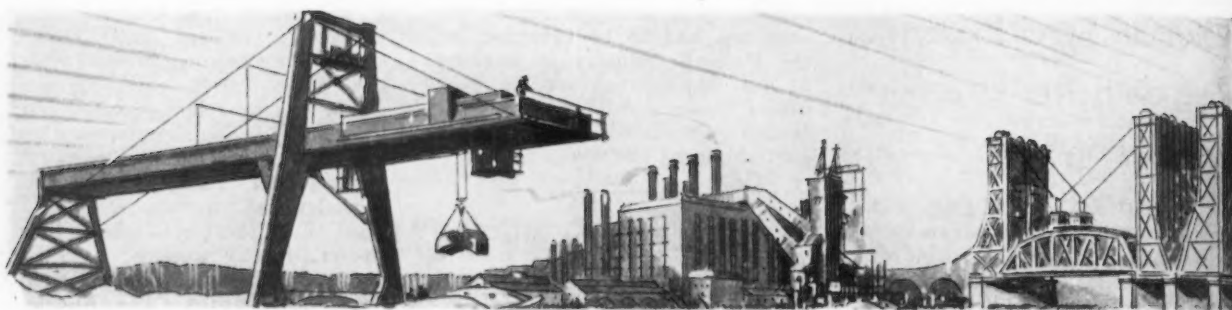
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## Plant Expansion and Equipment Buying

### Machine Tool Inquiry from Railroads Improves—Utilities More Active

**T**HE gradual improvement in machine tool inquiry from the railroads is probably the outstanding development of the month in this market.

The Delaware, Lackawanna & Western has just issued a sizable list and the Santa Fe is increasing its inquiry regularly. In the Chicago district, the public utilities are showing more interest in their equipment needs, but there is very little industrial demand.

The Electro-Motive Corp., subsidiary of the General Motors Corp., will require considerable equipment for the new locomotive manufacturing plant which it will soon build in the Chicago district. Demand from the automotive industry itself is dormant. The Lincoln company has bought a few tools and may be in the market again later in the spring.

#### ◀ NORTH ATLANTIC ▶

**Continental Can Co.**, 1 Pershing Square, New York, has purchased 8-acre tract at Elwood, Ind., for new plant, with power house and machine shop, work to begin in March. Cost over \$400,000 with machinery. Company has purchased plant of Janssen-Ostertag Mfg. Co., Kansas City, Mo., manufacturer of tin cans and containers, for new branch plant.

**Board of Education**, Hudson, N. Y., plans manual training department in new multi-story school, for which bids will be asked on general contract early in spring. Fund of \$540,000 has been arranged. Tooker & Marsh, 101 Park Avenue, New York, are architects.

**Arthur J. Harder, Inc.**, Kingston, N. Y., has been organized by Arthur J. Harder, Mount Marion, N. Y., and Ralph Hiller, Hurley, N. Y., to manufacture machinery and appliances.

**Bureau of Supplies and Accounts**, Navy Department, Washington, asks bids until Feb. 26 for steel boiler plates (Schedule 4325), 2000 lb. dished heads for feed water heaters (Schedule 4293), 56,610 lb. medium plate steel (Schedule 4322), 4880 lb. dished heads for feed water heaters (Schedule 4294); until March 1, 38,800 lb. steel forgings (Schedule 4317) for Brooklyn and Philadelphia navy yards; until Feb. 26, eight boiler water gages and spare parts (Schedule 4299); until March 1, two electric-driven winches and spare parts (Schedule 4303) for Brooklyn and Charleston yards; 70 acetylene pressure gages, 60 hydrogen and oxygen gages, and 300 cylinder valves for Brooklyn and Mare Island yards (Schedule 4343).

**United States Rubber Co.**, Broadway and Fifty-eighth Street, New York, manufacturer of tires, mechanical rubber goods, etc., has leased three-story building at Canal and Magazine Streets, New Orleans, and will remodel for new factory branch,

storage and distributing plant. Cost about \$40,000.

**Shipman Sprinkler Corp.**, New York, has been organized by Edward F. Shipman, 200 Church Street, New York, and Joseph G. Shipman, 497 Logan Street, Brooklyn, to manufacture sprinkler equipment, air-conditioning equipment, etc.

**Best Yeast Corp.**, New York, care of Thesingh & Moss, 75 West Street, engineers and contractors, has plans for new plant at Liverpool, N. S. Cost over \$75,000 with equipment. A subsidiary organization, Best Yeast Co., Ltd., has been formed under Nova Scotia laws, capital \$250,000, to carry out project. Engineers noted are in charge.

**Birk Iron Works**, Bronx, New York, has leased one-story building at 501 East 134th Street, for new plant.

**Board of Education**, Manhasset, N. Y., plans manual training department in new multi-story high school, for which bids will be asked on general contract in spring. Cost about \$200,000. Tooker & Marsh, 101 Park Avenue, New York, are architects.

**Devoe & Reynolds Co., Inc.**, 34 Oliver Street, Newark, N. J., manufacturer of paints, varnishes, etc., has let general contract for one-story addition, 14,000 sq. ft. floor space, to Douglas & Hueber Co., 605 Broad Street. Cost about \$35,000 with equipment. Epple & Kahrs, 17 Washington Street, are architects.

**Essex County Vocational Schools**, Hall of Records, Newark, N. J., Robert O. Beebe, director, asks bids until Feb. 25 for steel lockers, steel storage and filing cabinets, etc., iron, steel and other materials and supplies for machine shop, sheet metal shop, auto mechanics shop, aviation and electrical shops and other departments.

**Iron Forge Studios, Inc.**, Newark, has been organized under direction of Louis Rothberg, 1172 Raymond Boulevard, repre-

sentative, to manufacture ornamental metal products and specialties.

**Commanding Officer**, Picatinny Arsenal, Dover, N. J., asks bids until March 4 for reworking into forgings, 135,000 lb. brass scrap, 14,868 lb. brass cartridge cases, and 3055 lb. copper rotating bands (Circular 114).

**Germantown Heating & Plumbing Supply Co.**, Germantown, Philadelphia, has purchased site, 33 x 237 ft., at 5020 Germantown Avenue, for one-story heating and plumbing equipment storage and distributing plant, with pipe shop and other mechanical departments. Cost about \$30,000 with equipment.

**Bureau of Supplies and Accounts**, Navy Department, Washington, asks bids until Feb. 26 for one centerless grinder (Schedule 4338), one boring, drilling and milling machine (Schedule 4339), one two-wheel spur and helical gear grinder machine (Schedule 4340), one surface grinder machine (Schedule 4341), all motor driven, 800 ft. corrosion-resisting steel tubing (Schedule 4318), 300 ammeters, 325 volt-ammeters and 50 voltmeters (Schedule 4315); until March 1, reconditioning and modifications to aircraft engines (Schedule 900-8180) for Philadelphia Navy Yard, centrifugal ventilating fans and spare parts (Schedule 4301) for Philadelphia and other navy yards.

**Mummert-Dixon Co.**, 217 Philadelphia Street, Hanover, Pa., manufacturer of portable grinders, parts and kindred equipment, plans rebuilding part of plant recently destroyed by fire. Loss close to \$75,000 with equipment.

#### ◀ NEW ENGLAND ▶

**State Department of Mental Diseases**, State House, Boston, plans extensions and improvements in power plant at State hospital at Danvers, Mass., including new generator unit and auxiliary equipment. Cost close to \$40,000.

**Metal Products Corp.**, 510 Campbell Avenue, West Haven, Conn., manufacturer of metal specialties, has let general contract to A. B. Dibner, 905 Elm Street, New Haven, Conn., for one-story addition. Cost about \$25,000 with equipment. Marvin R. Hamer, New Haven, is architect.

**Hub Sheet Metal Works, Inc.**, Boston, has been organized by Wolf Sokolow, 26 Wentworth Terrace, Dorchester, Mass., and associates, to manufacture metal goods.

**Board of Education**, Mexico, Me., Leon B. Spinney, Redlonville, Me., chairman, plans manual training department in new multi-story senior high school, for which bids will be asked on general contract in March. Cost over \$100,000. Coombs & Harriman, 11 Lisbon Street, Lewiston, Me., are architects.

**A. H. Emery Co.**, Stamford, Conn., has been organized by A. H. Emery, 682 Main Street, and associates, to manufacture special machinery and parts, and other equipment.

**Board of Selectmen**, Auburn, Mass., plans manual training department in new



# Superior

## MILLED TOOTH FILES

**SUPERIOR BRAND  
FILES SAVE TIME  
AND MONEY FOR**



Automobile Body Builders



Pattern Makers



Sheet Metal Workers

**NICHOLSON**  
**U.S.A.**  
(TRADE MARK)

*The latest  
development*

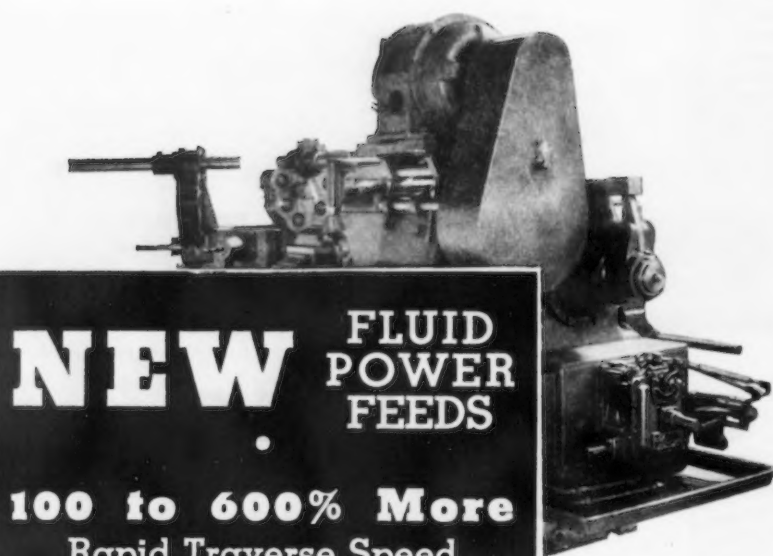
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These files have been produced to meet the demands of auto body builders and others who require a file to shear soft metal quickly and without clogging. They have exactly the right curve, rake and clearance for body and fender repairing . . . sheet metal work of all kinds.

Many of the Superior Brand Files are flexible and can be used effectively with handles on concave or convex surfaces.

Ask your hardware wholesaler or mill supply dealer to give you full details about Superior—the latest development in Milled Tooth Files.

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**PROVIDENCE, R. I., U. S. A.**



## NEW FLUID POWER FEEDS

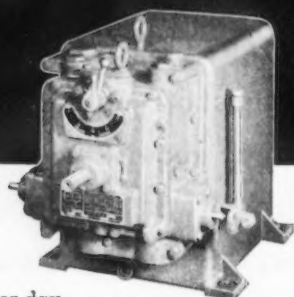
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Rapid Traverse Speed

Up to 50% Lower Cost

### Compensated

For Speed Variations Under Temperature and Working Conditions

Get Oilgear's  
Big New Book.  
Free, of Course



● Above: The Foster Fastermatic No. F-4, Oilgear Fluid Power Feed equipped. Makes three parts per hour—best previous time was five per day.

● At Right: A new Oilgear Fluid Power Feed. Note: Flanged mounting, as integral machine part . . . Inside pump eliminating hazard and bettering appearance . . . Self-contained; auxiliary valves, tubing, etc. are integral with pump . . . Many other exclusive features.

Builders and buyers hail these vastly improved machines as the way to step up sales and step down costs. The big new Oilgear Booklet gives all the facts—have you asked for yours yet? The Oilgear Company, 1311 West Bruce Street, Milwaukee, Wisconsin



## OILGEAR FLUID POWER FEEDS

(B-1302)

two-story high school, for which revised plans are being drawn. Bids will soon be asked on general contract. Cost about \$250,000. L. W. Briggs Co., 314 Main Street, Worcester, Mass., is architect.

### WASHINGTON DIST.

Chief of Ordnance, United States Army, Washington, asks bids until March 11 for one universal hexagon turret lathe, one horizontal boring mill, six universal horizontal milling machines, one hydraulic gear grinder, one automatic universal worm grinder, one hydraulic feed surface grinder (Circular 22), 10 turret lathes, one pipe-threading machine, one rip saw, one electric spot-welding machine, one coordinate comparator (Circular 23); until March 12,

two milling machines, one horizontal boring mill, one cylindrical grinder, one universal cylindrical grinder, one tool-room lathe, one swaging machine, four four-base facing machines, two two-base facing machines, one six-spindle polishing machine (Circular 24).

Maryland Distillery, Inc., Baltimore, has leased building at Preston and Brentwood Streets, for new storage and distributing plant. General contract for remodeling has been let to Engineering & Contracting Corp., 504½ St. Paul Street.

General Purchasing Officer, Panama Canal, Washington, asks bids until Feb. 25 for one motor-driven grinding machine, two wheels for grinding machine, one centrifugal fan, pipe hangers, 10,000 steel bolts, pipe fittings, snap switches, bibb

cocks, etc. (Schedule 3032), magnetic chucks, reamers, cap screws, 60,000 ft. packing case strapping, brass screws, couplings, 288 galvanized water buckets, 72 water coolers, 50 garbage cans, steel wire brushes, oil-burning lanterns and other supplies (Schedule 3030).

Department of Commerce, Commerce Building, Washington, plans rebuilding airplane hangar with shop facilities at local Bolling field, recently destroyed by fire. Loss over \$70,000 with equipment.

Bureau of Supplies and Accounts, Navy Department, Washington, asks bids until Feb. 26 for corrosion-resisting steel forgings for Washington Navy Yard (Schedule 4314).

### BUFFALO DISTRICT

Rochester Gas & Electric Corp., Rochester, N. Y., plans extensions and improvements in main generating plant, including new turbo-generating equipment, high-pressure boilers and other equipment. Cost about \$1,000,000.

H. D. Converse & Sons, Inc., Phelps, N. Y., has been organized by Howard D. Converse, Clifton Springs, N. Y., and Charles Converse, Newark, N. Y., to manufacture harvesting machines, reapers and kindred farm machinery.

Board of Education, Wilson, N. Y., plans manual training department in new multi-story high school, for which general contract has just been let to A. Friederich & Sons Co., 710 Lake Avenue, Rochester, N. Y. Cost about \$200,000.

Arntfield Gold Mines, Ltd., Toronto, Ont., Frederick S. Arntfield, president, plans development of gold-mining properties in northern Ontario, including new milling plant. Cost over \$150,000 with equipment.

### WESTERN PA. DIST.

Homestead Ice & Brewing Co., Homestead, Pa., has approved plans for new multi-story brewery. Cost over \$150,000 with equipment. Superstructure will begin early in March.

Sharon Coal & Limestone Co., Grove City, Pa., has authorized electrification of No. 2 coal-mining properties, near Grove City, with installation of new hoisting, loading and other equipment. Cost over \$25,000 with machinery.

Pittsburgh Plate Glass Co., Grand Building, Pittsburgh, has let general contract to Rust Engineering Co., Koppers Building, for extensions and improvements in plant at Mount Vernon, Ohio, including new units and machinery to double present capacity. Cost about \$750,000 with equipment.

### MIDDLE WEST

Safety First Coal Co., Belleville, Ill., plans rebuilding part of coal-mining plant near city, recently destroyed by fire. Loss about \$50,000 with equipment.

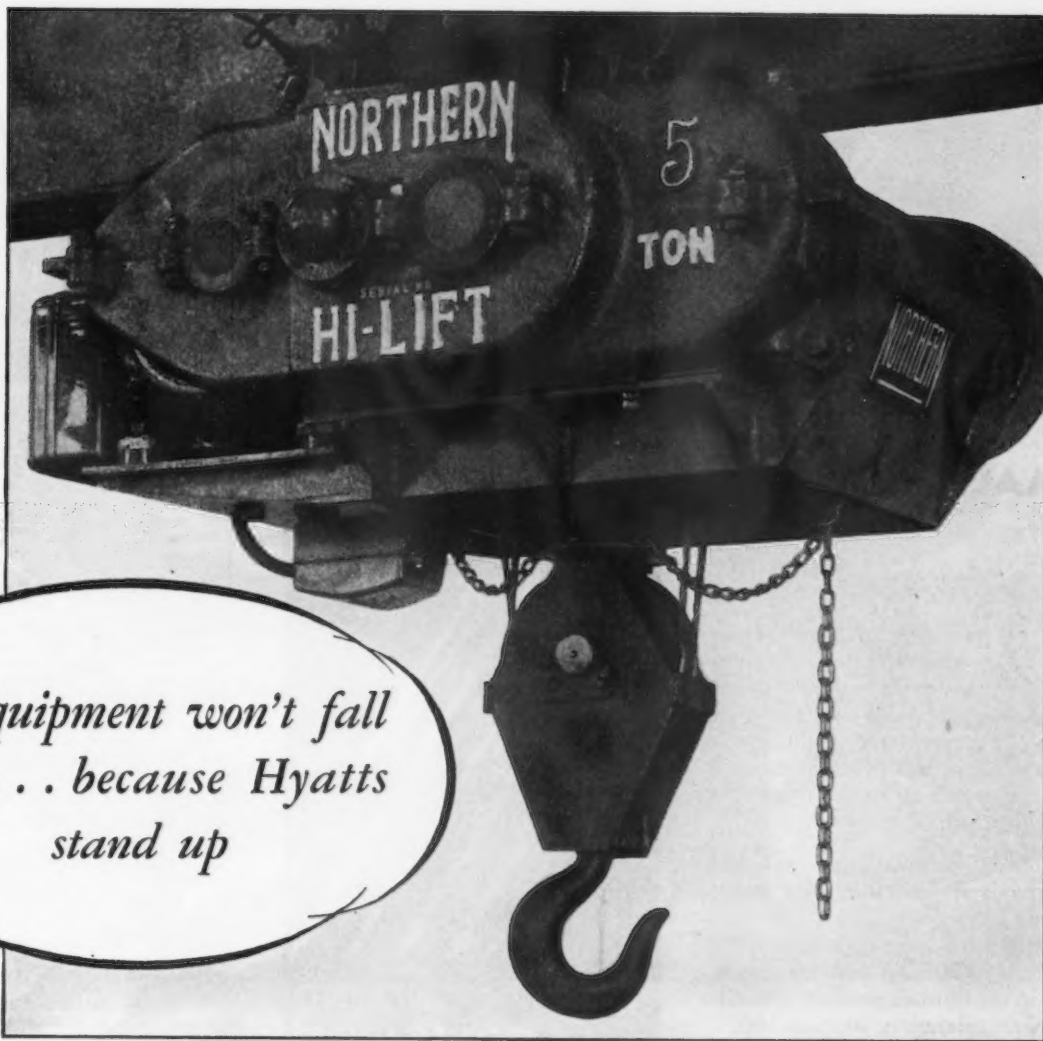
Carwheel Clamp Co., Room 1127, 33 North LaSalle Street, Chicago, has been organized by Morris Sider and associates, to manufacture mechanical equipment, parts, etc.

Lewis Packing Co., 4820 South Thirty-sixth Street, Omaha, Neb., meat packer, has let general contract to John Lof & Sons, 4012 Lake Street, for one-story and basement addition, 300 x 375 ft., including improvements in present plant. Cost over \$65,000 with equipment.

Farmers' Union Terminal Co., Minnesota Building, St. Paul, Minn., has work under way on new three-story bulk oil and oil-blending plant at South Park, South St. Paul, for which general contract recently was let to Graus Construction Co., Hastings, Minn. Cost about \$70,000 with machinery. Ellerbe & Co., Minnesota Building, are architects.

Southeastern Nebraska Power District, Beatrice, Neb., J. Edward Fisher, secretary, plans new electrical distribution system for light and power, totaling about 600 miles. Fund of \$575,000 is being arranged, including substations, switching stations and other field structures. Lawrence C. Black is engineer.

City Council, La Porte City, Iowa, is planning new municipal electric light and



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down . . . because Hyatts  
stand up*

Northern Hi-Lift Hoists are typical of the many kinds and makes of material handling equipment where Hyatt Roller Bearings serve so efficiently. All Hi-Lift Hoists from 3 to 5 ton size built by Northern Engineering Works of Detroit are Hyatt-equipped.

Uninterrupted operation and care-free performance justify the use of Hyatt Roller Bearings. The bearings selected for this or any comparable installation are individually designed to conform with specific operating conditions, to eliminate friction, reduce maintenance, minimize wear and stand the gaff.

That's why so many machinery and equipment builders standardize on Hyatts. And that is also why the many users of this equipment know they can rely on the protection that these better bearings afford. Hyatt Roller Bearing Company, Newark, Detroit, Chicago, Pittsburgh, Oakland.

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SELECTING the most adaptable material for your product may save as much as half of your fabricating cost.

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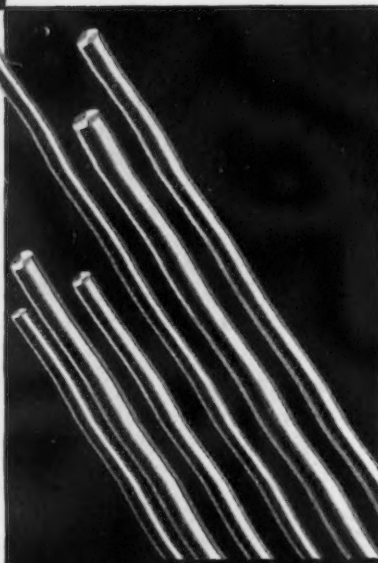
Let us tell you how you can profitably apply this bright finish bar stock to your own operations. Your inquiries are invited.

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**COLD DRAWN BARS AND SHAFTING  
FREE-CUTTING SCREW STOCK  
EXTRA WIDE FLATS SPECIAL SECTIONS  
ALLOY STEELS**

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## DRAWN, GROUND and POLISHED



under lease. W. H. Hazard is president, and A. J. Specht is factory manager. All but foundry operations are provided for.

### ◀ SOUTH ATLANTIC ▶

**Georgia Power Co.**, Atlanta, Ga., is arranging fund of \$2,135,000 for new construction, extensions and improvements in 1935, including power plants, transmission and distributing lines, substations and miscellaneous work.

**Kraft-Phenix Cheese Co.**, 400 Rush Street, Chicago, plans installation of automatic machinery, conveyors, loaders and other power equipment in two additions to plant at Atlanta, Ga., for which one-acre tract adjoining has been acquired. Cost about \$300,000 with machinery.

**Board of Education**, Anderson, S. C., plans manual training department in new multi-story junior high school. Cost about \$125,000. William Fant and Samuel M. Cathcart, Anderson, are architects.

**Town Council**, Fort Mill, S. C., plans new electrical distribution system for light and power supply. Cost about \$40,000. Financing is being arranged.

### ◀ SOUTH CENTRAL ▶

**Director of Purchases**, Tennessee Valley Authority, Knoxville, Tenn., asks bids until March 7 for designing, fabricating, galvanizing and delivering 664 steel transmission towers for new Wilson Dam-Norris Dam transmission line.

**Town Council**, Hardinsburg, Ky., asks bids until Feb. 26 for elevated steel tank and tower, filter equipment, pipe lines, etc., for municipal waterworks. Westcott, Thornton & Sargent, Cary Building, Owensboro, Ky., are consulting engineers.

**James E. Pepper Co.**, Lexington, Ky., has awarded general contract to Albert Lubrecht Co., Lexington, for seven-story and basement addition to distillery, for storage and distribution. Cost over \$100,000 with equipment. Carl J. Kiefer, Schmidt Building, Cincinnati, is consulting engineer. Company is a subsidiary of Schenley Distillers Corp., New York.

**Tennessee Electric Power Co.**, Chattanooga, Tenn., is arranging fund of \$350,000 for extensions and improvements in power stations, transmission and distributing lines in Chattanooga district, including new lines for electric light and power service, substations and other structures.

### ◀ OHIO AND INDIANA ▶

**Department of Public Service**, City Hall, Columbus, Ohio, W. J. Lucks, director, plans early call for bids for new municipal incinerator plant. Cost about \$100,000 with conveying, loading and other power equipment. Paul Mietzel, City Hall, is city engineer.

**Electro-Motive Corp.**, Cleveland, affiliated with Winton Engine Co., 2160 West 106th Street, manufacturer of Diesel engines and parts, both subsidiaries of General Motors Corp., is acquiring property near Chicago as site for new plant for production of Diesel-electric locomotives. Plant will consist of several units for parts production and assembling. Diesel engines will be furnished by Winton company, with installation carried out at new works. First unit is scheduled for completion during summer. Cost over \$650,000 with equipment.

**Standard Battery Mfg. Corp.**, Cleveland, has been organized by F. H. Schwartz and Louis O. Miller, 335 Leader Building, and associates, to manufacture electric storage batteries and kindred equipment.

**Palmer Co.**, 26 Clay Street, Cincinnati, manufacturer of industrial thermometers and kindred precision equipment, has leased space in building at 104 Lombard Street, Toronto, Ont., for branch factory for Canadian trade.

**Material Division**, Air Corps, Wright Field, Dayton, Ohio, asks bids until Feb. 26 for welding hose (Circular 495); until Feb. 27, meter and transmitter assemblies (Circular 491), tachometer assemblies (Circular 448), 531 transformers (Circular 488); until Feb. 28, 11 power and control panels and cabinet, and seven panel and

power plant. Bond issue of \$100,000 is being arranged. G. E. Stebbins is city clerk.

**Wander Co.**, 180 North Michigan Avenue, Chicago, manufacturer of malt products, has asked bids on general contract for three-story addition to plant at Villa Park, Ill. Cost over \$65,000 with equipment. Richard Griesser & Son, 64 West Randolph Street, are architects.

**General Wheel Goods, Inc.**, Two Rivers, Wis., has been organized by Elmer and Allen Drumm and A. N. Dedricks, Manitowoc, Wis., to manufacture metal stampings, more especially toys, construction sets, playground equipment, coaster wagons, etc., operating in plant of former Two Rivers Wood & Metal Products Co. Considerable new equipment will be purchased. Same interests operate Metalware Corp., Two Rivers, manufacturer of cooking utensils and electrical appliances.

**Municipal Water and Light Commission**, Marshfield, Wis., has commissioned Ralph D. Thomas & Associates, consulting engineers, Minneapolis, to direct improvements to cost about \$75,000 in steam generating plant, including new boilers, forced draft equipment and other accessories. Bids will be taken about March 15.

**Cedarburg Mfg. Co.**, Cedarburg, Wis., producer of small electric motors, metal stampings, etc., is adding new line of light, low-cost outboard engines, built chiefly of alloy steels. Thorvald Hansen is president and chief engineer.

**Sta-Rite Products, Inc.**, Delavan, Wis., expects to be ready to start production March 1 of new line of electric motor or gas engine driven deep and shallow well pumping units for farms, estates, etc., in factory now being completed by Delavan Chamber of Commerce and to be occupied



## THE VITALIZER THAT MAKES THE WINNER

It is often the invisible extra spirit or infinitesimal extra energy that makes the priceless difference between "a race horse" and "a great race horse." A similar striking distinction exists between ordinary irons and steels and those into which "Moly" has injected the spark of virility that leads to outstanding qualities for strength, wear, machinability, easy heat-treating, and toughness combined with hardness. Moly really "does something to iron and steel"—many things, in truth. Even more amazing is the fact that so little does so much; and that the slight added cost is repaid over and over in product betterments.

Example: There are many pearlitic steels not containing Moly, which have high physical properties. They even show good strengths at elevated temperatures, if the test is made quickly. But seldom do they hold up over long periods at such temperatures. Accordingly, their "creep strength" is low. Add Moly to such — or *any* — steels, and the "spark of life"

introduced results in the retention of strength and form under similar conditions. Results of both experimental and service tests on many different high-temperature applications are yours for the asking.

The developments and applications which have marked Moly's fifteen years of progress would in themselves make a volume of metallurgical history. Investigate. Learn about Moly's widespread uses and acceptance among steel companies, foundries, tool makers, manufacturers of steel-fabricated products. WRITE particularly for these interesting books: "*Molybdenum in 1934*" and "*Molybdenum in Cast Iron — 1934 Supplement*." Also ask to be put on the mailing list for our periodical house organ, "*The Moly Matrix*." And, if you've an alloy problem of your own, our metallurgists and experimental laboratory in Detroit will be glad to help you. Climax Molybdenum Company, 500 Fifth Avenue, New York City. (In Canada: Railway & Power Engineering Corp., Ltd.)

# CLIMAX Mo-lyb-den-um



## FARREL-SYKES *The Gear With a Backbone*

### For Connecting Parallel Shafts Specify

"THE GEAR WITH A BACKBONE"



When you use Farrel-Sykes continuous tooth herringbone gears for transmitting power and transforming speed, the following advantageous features assure you of dependable, trouble-free service in every condition of service:

1. Precision generated with true involute teeth.
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3. 20% to 40% more bearing surface.
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5. High mechanical efficiency—98.9% to 99.44%.
6. Greater load carrying capacity.
7. Suitable for higher velocities.
8. No end thrust.
9. Smoother action.
10. Quieter operation.

Farrel-Sykes Gears are available in any size from 1/4 inch to 22 feet diameter. Our staff of engineers, with many years of experience in the design, manufacture and operation of gears, will gladly give you recommendations on any gear application.

## FARREL-BIRMINGHAM

COMPANY, INC.

333 Vulcan Street, Buffalo, N. Y.

framework assemblies (Circular 492), lamp assemblies, market type; 438 lamp assemblies, field outline type; and 18 top assemblies, complete with gaskets, screws, etc. (Circular 493).

**Schoenling Brewing & Ice Co.**, 1624 Central Avenue, Cincinnati, plans extensions and improvements for storage and distribution, and other service. Cost close to \$40,000 with equipment.

**J. F. Kramer Foundry Co.**, Cleveland, has been organized by Joseph Kramer, care of Samuel Rac, 3324 Lorain Avenue, representative, and associates, to manufacture iron and other metal castings.

**Naas Corp.**, Sunman, Ind., food canner, has acquired building at Portland, Ind., and will remodel for new branch canning plant. Cost about \$35,000 with machinery.

**Board of Public Works**, Auburn, Ind., plans extensions and improvements in municipal electric light and water plant, including two motor-driven pumping units and accessories, 300-kva. generator and auxiliary equipment.

### ◀ SOUTHWEST ▶

**Pittsburgh Plate Glass Co.**, Grant Building, Pittsburgh, has let general contract to Manhattan Construction Co., Muskogee, Okla., for three one-story additions to branch plant at Henryetta, Okla., two units each 40 x 375 ft., and another structure, 160 x 200 ft., latter for storage and distribution. Cost over \$350,000 with equipment. A. B. McClure is plant superintendent.

**City Council**, Harrison, Ark., is arranging special election to vote bonds for \$130,000 for new municipal electric light and power plant, including distribution lines. Rex Worthington, mayor, is active in project.

**Board of Education**, Laredo, Tex., plans manual training department in new multi-story high school, for which bids will soon be asked on general contract. Fund of \$300,000 has been arranged.

**Bethlehem Steel Co.**, Petroleum Building, Houston, Tex., has leased one-story building, 120 x 200 ft., at 600 Bringham Street, and will remodel for new storage and distributing plant for steel and sheet products. General contract has been let to L. V. Miller, Houston, for building modernization.

**Southwestern Flow Valve Corp.**, Fort Worth, Tex., has been organized by L. B. Otey and C. F. Greenwood, 2262 Fifth Avenue, to manufacture valves and kindred engineering products.

### ◀ MICHIGAN DISTRICT ▶

**Olds Motor Works**, Lansing, Mich., a division of General Motors Corp., Detroit, has plans for one-story addition. Cost about \$175,000 with equipment.

**Inland Refineries, Inc.**, Mount Pleasant, Mich., care of E. G. Guy, Mount Pleasant, consulting engineer, recently organized, has purchased tract of about 13 acres at Drayton Plains, Mich., as site for new refinery for production of gasoline, kerosene and other products. Cost over \$125,000 with equipment. Carl L. Skidmore is president and Benjamin F. Hall, secretary.

**Bridgeport Core & Sand Co.**, Saginaw, Mich., foundry supplies, plans one-story addition, 56 x 135 ft., for storage and distribution. Cost close to \$25,000 with equipment.

**Turnmilling Corp.**, Jackson, Mich., has been organized by G. W. Blackinton, Union & Peoples National Bank Building, to manufacture metal-working machinery and parts, tools, etc.

**Roycraft Trailer Coach Co.**, 19049 West Warren Street, Detroit, manufacturer of motor coaches, parts, etc., has taken over plant of Chesaning Furniture Co., Chesaning, Mich., for new works. Detroit plant will be removed to new location and capacity increased.

### ◀ PACIFIC COAST ▶

**Libby, McNeill & Libby**, 60 California Street, San Francisco, food canners and meat packers, with headquarters at Chicago, have asked bids on general contract for new canning plant at Walla Walla, Wash., where 7-acre tract was recently acquired. Plant will consist of two one-story units for processing and canning, and storage and distribution respectively, 100 x 160 ft., and 100 x 100 ft. A power house, 40 x 50 ft., will be built, and machine shop. Cost over \$200,000 with equipment.

**Bureau of Supplies and Accounts**, Navy Department, Washington, asks bids until March 1 for two motor-driven fuel oil service pumps and spare parts (Schedule 3047), propeller parts for controllable pitch propellers (Schedule 900-8178) for San Diego naval station; quantity of globe, angle, check and gate valves (Schedule 4297) for Puget Sound Navy Yard.

**Bakersfield Brewing Co.**, 1660 Chester Avenue, Bakersfield, Cal., has let general

contract to Williams & Greenough, 130 Lincoln Street, for new three-story brewing plant, with one-story bottling works, adjoining. Cost over \$80,000 with equipment.

**Board of Marion County Supervisors**, Salem, Ore., has plans for new mechanical equipment and repair shops in Painters Woods district, consisting of two one-story units, 70 x 120 ft., and 50 x 180 ft., with smaller structures for pumping plant, oil and gasoline storage and distribution, service station, etc. L. I. Engstrom is engineer.

**Great Western Malting Co.**, Vancouver, Wash., J. R. Bowles, vice-president, recently organized, has let general contract to Dougan-Hammond Construction Co., Studio Building, Portland, for seven-story plant on waterfront site, leased from Port of Vancouver Commissioners, 114 x 135 ft., with several smaller units. Cost about \$300,000 with machinery.

**Wilshire Oil Co.**, 2455 East Twenty-seventh Street, Vernon, Cal., has plans for new gasoline refinery at Santa Fe Springs, Cal. Cost over \$85,000 with equipment, including tanks, etc.

**Horluck Brewery Co.**, Westlake Avenue, Seattle, has engaged Joseph Wohleb, Chambers Building, Olympia, Wash., architect, to draw plans for an addition, primarily as a mechanical bottling works. Cost about \$35,000 with equipment.

### ◀ FOREIGN ▶

**British Tin Smelting & Refining Co.**, Liverpool, England, recently organized as an interest of Straits Trading Co., Ltd., Singapore, Straits Settlements, and London, England, plans erection of new tin smelting plant near Liverpool. Cost over \$500,000 with equipment.

**Purchasing Department**, Harbour Board, Auckland, New Zealand, asks bids until May 28 for four 5-ton electric, semi-portable jib cranes and spare parts.

**International Harvester Co.**, Rosario, Argentina, plans rebuilding part of plant recently destroyed by fire. Loss over \$400,000 with machinery. Company headquarters are at 606 South Michigan Avenue, Chicago.

**Coal & Allied Industries, Ltd.**, London, England, J. Hughes Rice, engineer, plans new plant at Seaham, England, for coal by-products manufacture. Cost about \$500,000 with equipment.

## New Trade Publications

**Conveyors.**—Standard Conveyor Co., North St. Paul, Minn. Bulletin, 12 pages. Photographic illustrations of steel mill and foundry installations together with detailed descriptions. Particular attention is paid to the conveying of larger and heavier units by both power and gravity equipment.

**Gas Engines.**—Worthington Pump & Machinery Corp., Harrison, N. J. Eight-page bulletin. Cuts, diagrams and detailed descriptions of construction of the vertical four cycle types BG, CG, DG and EG. Worthington Gas Engines.

**Heat Treating Machines.**—Worthington Pump & Machinery Corp., Harrison, N. J. Bulletin, 12 pages. Cuts of installations. Description of automatic drill-steel heat-treating equipment and process, including its operation with electric furnaces. Diagrams of construction and operation of unit furnace and quenching equipment. Descriptions of forging furnaces and suggestions of shop layouts for treatment of rock-drill steel.

**Meters.**—Electric Storage Battery Co., Philadelphia. Folder informative as to purposes of the Exide float meter and descriptive of its operation in maintaining a desired average voltage from day to day.

**Electrodes.**—Air Reduction Sales Co., 60 East Forty-second Street, New York. Eight-page leaflet descriptive of shielded arc electrodes, including recommended current values in tabulated form for various positions.

**Lift Trucks.**—Barrett-Cravens Co., 3255 West Thirtieth Street, Chicago. Folder descriptive of mechanical and operating features of a new line of four-stroke lift trucks having 6000 lb. capacity.



Now available from **RYERSON.**

## LEADED PHOSPHOR BRONZE

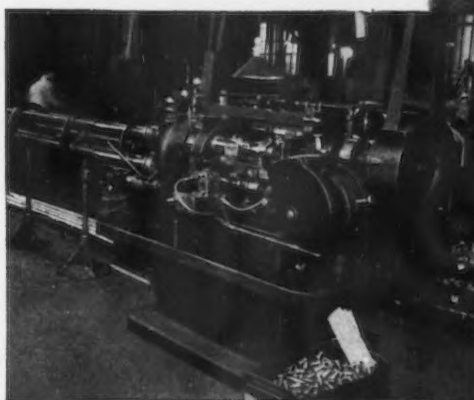
## BEARING STOCK

*in 6 ft. lengths*

**D**ISTRIBUTED exclusively in the United States by Ryerson, these Permite "speed length" bars, produced by a patented process, bring you important advantages never before combined in a leaded bronze bearing stock.

Economical production of superior bearings or parts on a screw machine or turret lathe—never before possible—is easy with these 6-foot cast bars, identical in physical and wear-resisting qualities with the finest individual castings. Costly patterns, delays of molding, cleaning, and core-making are eliminated. Permite bars are in stock for immediate delivery. And their free machining qualities permit maximum production rates. The use of Permite cast bars saves you money on high-grade parts, and enables you to keep your inventory low.

Vast savings for users of bronze parts, and profitable new business for screw machine operators, are assured by Permite Leaded Bronze Bars. Write today for new folder giving full information and specifications.



# PERMITE *Leaded* *Phosphor Bronze* BARS

JOSEPH T. RYERSON & SON, INC.

CHICAGO — MILWAUKEE — ST. LOUIS — CINCINNATI — DETROIT  
CLEVELAND — BUFFALO — BOSTON — PHILADELPHIA — JERSEY CITY

MORE ECONOMICAL

SUPPLIED IN ANY ALLOY

IN 6 FOOT OR SHORTER LENGTHS

DIAMETERS  $\frac{5}{8}$ " TO 2" BY  $\frac{1}{16}$ " STEPS

Permite Bars are turned to an accuracy of plus or minus .002". When desired, bars can be furnished in over-sizes, leaving stock for truing up on your own machines.

# RYERSON STOCK SERVICE

## "HOPKINS" AIR OPERATED ARBOR PRESSES

Rapid and efficient operation. Two bearings for the ram insuring long life without sideplay. Pull is transmitted from the base casting and the piston stops in the cylinder at the end of the stroke, reducing strain on the frame to a minimum. Eight sizes, varying in power from 1000 lbs. to 18,000 lbs.

Write for circular.

**THE TOMKINS-JOHNSON CO.**

628 N. Mechanic St., Jackson, Mich.



## Steel Rule Dies for Folding Paper Boxes

(CONTINUED FROM PAGE 35)

standard 0.918-in. height of steel creasing rule. In such instances, there is only the difference of 0.005 in. between the height of the creasing rule and that of the cutting rule.

Extra hard and hard tempers of steel cutting rule are used for the straight-line parts of cutting and creasing dies, also for angles up to 45 deg. Because they are so utilized, the extra hard and hard tempers of rule require no special heat treatment or tempering during the die-making process. The same is true of the regular hard temper of steel creasing rule, as this, too, is employed only in straight sections of the dies.

Soft and dead soft steel cutting rules are to be used for curved, round and other odd-shaped sections of cutting and creasing dies. These rules, after having been bent to desired shapes, necessitate heat treatment and tempering. The regular soft steel rule can be bent readily to nearly all odd shapes, while the dead soft steel rule may be easily bent to the more intricate shapes, including small, round corners and "waves." With the aid of an ordinary flat-jaw bench vise and a pair of pliers, the die maker can bend strips of either soft or dead soft steel rule to any desired shape. In large die-making plants,

however, the full range of mechanical equipment includes a patented steel rule-bending press, a steel rule cutter, and an assortment of hard steel stock male and female dies, sets of which are used in the press. By means of these sets of male and female dies and pressure on them from the rule-bending press, strips of the soft or dead soft steel cutting rule, of any standard body thickness, can be bent accurately to the shape determined by each set of dies. By the same method it is an easy matter to duplicate the bent shape of each rule any number of times, as required, for multiple or "gang-forms" of cutting and creasing dies.

### Dummies Are Used for Patterns

Before starting the work of setting up either a single cutting and creasing die or a form of duplicate dies, it is necessary for the die maker to have a pattern or a "dummy" of the folding boxes which are to be cut and creased. From this pattern measurements are taken with a ruler and a pencil as to the various lengths of both the cutting and the creasing rules required for the die-form. These measures and the number of each length of rule needed are written on a sheet of paper, this serving as a record. Then the steel rule cut-

ter is set first to cut the longest pieces of rule, as indicated by the record. Next, the cutter is set to cut rules of another length, and so on until all the desired lengths of rule and the quantity of each have been cut. The sets of rule are then arranged in systematic order on a work-table, ready for the work of heat treatment and later for setting up in the die.

In large plants producing hundreds of steel rule dies of many varieties, often a furnace is employed for hardening and tempering bent pieces of soft and dead soft steel cutting rule. The so-called muffle type of furnace, which gives uniform heat distribution, is used for large quantities of work, also the pot type of furnace, which uses a liquid heating medium, and handles the work in baskets. The recommended amount of heat, for drawing or tempering, is from 780 to 840 deg. Fahr., according to the sizes of the material. The hardening heat may be up to 1400 deg. Fahr. Where the equipment does not include a pyrometer, the maximum heat can be indicated by a magnet, the test point ascertained when the hardened steel becomes non-magnetic.

In the average steel rule die-making plant, however, the furnace equipment would be too expensive. Therefore, the more simple methods of hardening and tempering bent shapes of steel cutting rule are described briefly as follows:

The necessary equipment consists of: 1. A gas flame; either a Bunsen burner or an ordinary gas jet, one or more as desired. 2. A deep metal pan, large enough to receive all sizes and shapes of the bent rule handled in the plant. 3. A supply of any well-known make of tempering oil. 4. A pair of tongs, to be used in handling the rules for heat treatment. 5. A steel plate, about 10 x 14 in. and about 3/32 in. thick. 6. Two insulating bricks (Celite), to be used as bases for the steel plate. 7. A stiff bristle hand-brush. 8. A quantity of fine sawdust, to be used in cleaning the heat-treated rule.

### Hardening and Tempering

With the aid of the pair of tongs, the die maker holds each piece of bent soft steel rule over a Bunsen burner, or a gas jet, until the rule is heated to a cherry red color. In numerous cases, several pieces of rule can be heated in this manner at one time.

Immediately, the heated rule is immersed, or quenched, in a bath of tempering oil, this oil having been placed in the deep metal pan already mentioned. This process





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hardens the soft steel rule as it cools in the bath.

The next step is to clean the hardened rule with the stiff bristle brush and the fine sawdust. This cleaning method is to remove oil and scale from the rule, especially from its cutting edge.

For the tempering process, the steel plate is first heated to a cherry red color, over the Bunsen burner or the gas jet, then the heated plate is placed in flat position on the two insulating bricks. Working rapidly, the die maker places the hardened and cleaned pieces of rule,

cutting edge up, on the surface of the red-hot steel plate, to be drawn or tempered. A number of pieces of rule may be placed on the hot plate at the same time. The rule should remain there until it becomes a straw color—clear up to the cutting edge. The tempered rule is then removed from the plate and allowed to cool by air.

Steel rule cutting and creasing dies, single or multiple, as set up complete with any of the following kinds of "blank" material: 1. Plain cherry or birch lumber. 2. Glued-up cherry or birch lumber. 3. Laminated 5-ply birch blocks. 4. Labor-saving lead, semi-steel, aluminum-alloy and iron furniture (of the kinds used by printers), also with quads, leads and slugs.

When lumber of any of the standard kinds mentioned is utilized, the steel rules are to be inserted in blocks of the wood. First, with a pattern, ruler and lead pencil, the die maker marks on the proper surface of the wood the exact positions where all the cutting and creasing rules are to be inserted. These penciled lines show where mortising is to be done. The mortising is produced, entirely through each block, with a power jig-saw or a band-saw. The cutting and creasing rules are inserted. The complete die-form is then locked up in a steel chase, ready for the press.

### All-Metal Dies

All-metal cutting and creasing dies, set up with labor-saving units of metal furniture, quads, leads and slugs, are the most accurate dies of their class which can be constructed. Dies of this type will not warp, expand or shrink under changing atmospheric conditions. All specifications for single or multiple all-metal cutting and creasing dies are based on the American type point system. This is a great advantage over wood-base dies, as all the spacing material entering into the construction of these all-metal dies can be premeasured and "counted" for sizes by points. The die maker works much like a hand compositor setting a form of type. The steel rules for the die are set up and held in exact positions in a form with such selected spacing material as: Various unit sizes of metal furniture, quads and spaces, 2-point leads, 6 and 12-point lead slugs and 1-point brasses, the latter used for fine adjustments. In the case of a large form of duplicate dies, the die maker first sets up one die complete. He then uses precisely the same kinds and sizes of labor-saving metal spacing material in setting up each of the duplicate dies. The complete die form

is locked up for the press in the usual manner.

"Corking" a form of cutting and creasing dies is necessary so that when the form is on a press, and as each impression is taken, the corks will push the cut and creased sheet from off the form. The "corking" method consists of gluing small, rounded pieces of cork, in rows, on to the low spacing material in the form—in close positions to both sides of all cutting rules in the form.

On the press, a counter-die must be made to work with the creasing rules in the die form. The counter-die is made easily, first by gluing a sheet of chip-board or straw-board, about 0.020 in. thick, to the impression cylinder of a flat-bed cylinder press, or to the platen of a platen press, as the case may be. Then all the creasing rules in the form are inked, and an impression of the form is taken on the surface of the glued-on sheet of paper-board, this showing plainly the positions of the inked creasing rules. The printed lines are carefully cut out of the board, like narrow grooves, with a sharp penknife. This forms the counter-die.

## New Trade Publications

**Circuit Breakers.**—General Electric Co., Schenectady, N. Y. Bulletin, four pages. Describes design, construction and operation of d.c. air circuit breakers, solenoid-operated.

**Valves.**—Smolensky Valve Co., Cleveland. Bulletin No. 12, four pages. Radial flow noiseless check valves. Special installation for sewage disposal treatment.

**Hand Trucks.**—Fairbanks Co., 393 Lafayette Street, New York. Bulletin, 15 pages, describing new series 9000 multiple hand trucks and truck wheel equipment.

**Aftercoolers.**—Ingersoll-Rand Co., 11 Broadway, New York. Bulletin, 12 pages. 8½ x 11 in. Detailed description and treatise covering aftercoolers for air or gas.

**Testing Machines.**—Gogan Machine Corp., 1444 East Fifty-Fifth Street, Cleveland. Bulletin. Hardness testing machines. Description, charts and diagrams.

**Stop Nuts.**—Elastic Stop Nut Corp., Elizabeth, N. J. Bulletin. Pictured applications and descriptions of industrial types and uses, including standard lists.

**Valves.**—Merco Nordstrom Valve Co., a subsidiary of the Pittsburgh Equitable Meter Co. Service chart devoted to operation and care of Nordstrom lubricated plug valves. It is printed on heavy stock suitable for wall mounting.

**Car Axle Drive.**—Medart Co., St. Louis. Bulletin No. 48, descriptive, with charts and drawings, of the Medart compensating car axle drive for lighting and air-conditioning generators, compressors, etc.